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DOMINION OF CANADA—DEPARTMENT OF AGRICULTURE

AN ECONOMIC CLASSIFICATION OF LAND

IN FIFTY-SIX MUNICIPAL DIVISIONS,
SOUTH CENTRAL SASKATCHEWAN

C. C. SPENCE and E. C. HOPE

MARKETING SERVICE—ECONOMICS DIVISION
DOMINION DEPARTMENT OF AGRICULTURE

in co-operation with

DEPARTMENT OF FARM MANAGEMENT
UNIVERSITY OF SASKATCHEWAN



Published by Authority of the Hon. JAMES G. GARDINER, Minister of Agriculture,
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FOREWORD

THE funds necessary for carrying on this project were made available under the Prairie Farm Rehabilitation Act and by the Saskatchewan Research Foundation. The study has been made possible through the generous co-operation of the farmers and municipal officials in south central Saskatchewan.

Aerial photographs of the area taken by the Royal Canadian Air Force in the fall of 1937 and 1938 were made available for this study by the Bureau of Geology and Topography, Department of Mines and Resources, Ottawa, Canada. These proved valuable aids in assembling the cultivated-land pattern and the general picture of the physical features of the land.

Since the beginning of the project, advice on the interpretation of soil mapping has been frequently sought from and willingly given by members of the staff of the Soils Department, University of Saskatchewan.

Mr. H. Van Vliet of the Department of Farm Management, University of Saskatchewan, and Messrs. G. C. Elliott, L. S. Matthews, S. Mysak and R. A. Stutt of the Dominion Economics Division, Saskatoon, assisted in various phases of the field surveys and office tabulations. To all these, and others who have aided in the study, the authors are indebted.

This project is one of two similar activities now being carried on in Western Canada. In the Province of Alberta, the Economics Division, Marketing Service, Dominion Department of Agriculture is co-operating with the University of Alberta in classifying land in the drought area of that province. The two areas now classified make up nearly one-fifth of the occupied area in the three Prairie Provinces and a somewhat larger proportion of the open plains.

Although the two projects have been carried on independently, there has been continual co-ordination of effort and frequent interchange of ideas and personnel. Similar methods were adopted in order that uniformity might be secured in the classification established in both provinces.

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LAND CLASSIFICATION IN SOUTH CENTRAL SASKATCHEWAN

C. C. SPENCE¹ and E. C. HOPE²

INTRODUCTION

In 1920 following a three-year period of partial or complete crop failures in southwestern Saskatchewan due to drought, the Saskatchewan Royal Commission of Enquiry into Farming Conditions recommended that a soil survey should be made of the settled area of Saskatchewan to be followed by a more complete agricultural survey. With the financial assistance of the Dominion and the Provincial Departments of Agriculture the soil survey was undertaken by the Soils Department of the University of Saskatchewan, and was completed by 1935 for the larger part of the settled area.

With the soil mapping available it was possible to begin the more complete agricultural survey. This would naturally include an examination of the economic aspects of the land resources. The economics of land evolves from its use. With a view to determining land use in Saskatchewan and its potentialities, this study³ was undertaken in the south central part of the province by the Economics Division, Dominion Department of Agriculture, in co-operation with the Department of Farm Management, University of Saskatchewan.

Land utilization studies aim at determining the type of farming best adapted to an area and to individual farms. They indicate the relationship between climate, soil, topography and various economic factors—and the effect of these on income and standards of living. They provide a basis for the application of sound credit and taxation policies and indicate the financial support likely to be available for the maintenance of public utilities and social services. A step toward attainment of these objectives is some form of classification of the land based on its economic potentialities. The classification of the land in south central Saskatchewan, which is dealt with in this report, is part of an undertaking involving the whole of the drought area. It is believed that the information presented—and that which will be available in later reports—will contribute to a more effective use of the lands in the area in question.

AREA OF ECONOMIC SURVEYS

The area included in this report comprises forty-eight rural municipalities and eight local improvement districts in south central Saskatchewan located west, southwest and southeast of Moose Jaw, and extending west beyond Swift Current and south to the International Boundary. It contains over eleven and one-half million acres of land.

¹ Assistant Agricultural Economist, Marketing Service, Economics Division, Dominion Department of Agriculture.

² Professor of Farm Management, University of Saskatchewan.

³ See also "Physical and Economic Factors Related to Land Use Classification in Southwest Central Saskatchewan" Department of Farm Management, University of Saskatchewan, and Economics Division, Dominion Department of Agriculture. Publication 609, Dominion of Canada, Department of Agriculture.

PHYSICAL CHARACTERISTICS OF THE AREA

Land Surface and Drainage.—In general there are four topographic divisions in the area: (1) the lower plains division in the northeastern fringe; (2) the Missouri Coteau; (3) the higher plains in the central region; (4) the southern plateaus (figure 1).

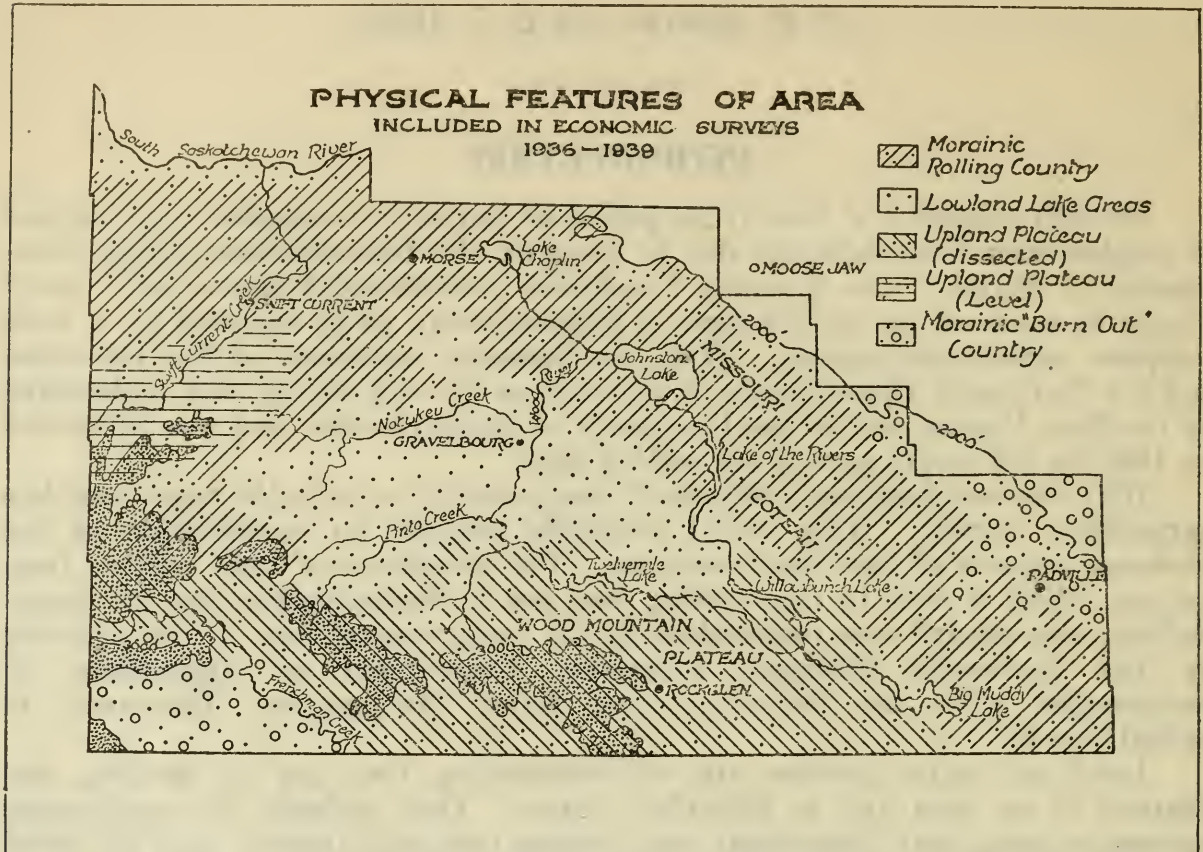


FIG. 1.—Physical Characteristics of the Area.

The lower plains division, in the northeastern fringe of the area, ranges in elevation from 1,850 to 2,050 feet above sea level and is the southwestern extremity of the broad plain to the east. In general the topography is level to undulating. Except on the poorer soils and poorly drained depressions practically all of the land is under cultivation.

South and west of this lower plains division there is a definite rise in elevation. On the edge of this height of land there is a morainic rolling belt 25 to 30 miles wide running in a northwesterly direction across the area. This is commonly known as the Missouri Coteau. In this belt there are a number of steep hills—usually quite stony—and undrained depressions. Little land has been broken in the rougher parts of this belt. Extending through, and marking in places the western boundary of the Coteau, is a depression or valley. Approaching the depression the land is less rolling and the greater part is under cultivation. Lake Chaplin, Johnstone Lake, Lake of the Rivers, Willow Bunch Lake and Big Muddy Lake lie in this valley. The latter three are long and narrow and all are shallow and alkaline. In recent years these lakes have been dry during part of the summer and fall seasons.

West of the Coteau in the central and western region is a broad level to gently rolling plain with the height of land gradually rising toward the west. The rise is more pronounced in the western part of the area in the direction of the Cypress Hills, forming a fairly expansive broad plateau 2,800 to 3,000 feet above sea level. A number of coulee-cut gullies occur at the edges of the

plateau and on the borders of the several streams, especially along the Frenchman River and Swift Current Creek. More than 80 per cent of this plains area in the central and western region has been brought under cultivation.

West of the Coteau in the southern part of the area is the Wood Mountain plateau, the altitude of which varies from 2,500 to 3,300 feet. Characterizing this area are a number of broad plateaux cut up by numerous coulees into many small, smooth plateaux or benches. These benches vary in extent from a few acres to several sections of land, and except in the southwestern part of the plateau much of the land on these benches has been broken.

In general the whole area is well drained—in fact much of the rolling land is too well drained. The poorly drained portions are confined to the stream flats and to numerous sloughs and small lakes which were dry during the drought years.

Soil⁽⁴⁾.—The whole area except the northeastern fringe lies in the brown soil zone—the short grass prairie region (Fig. 2). The northeastern fringe lies

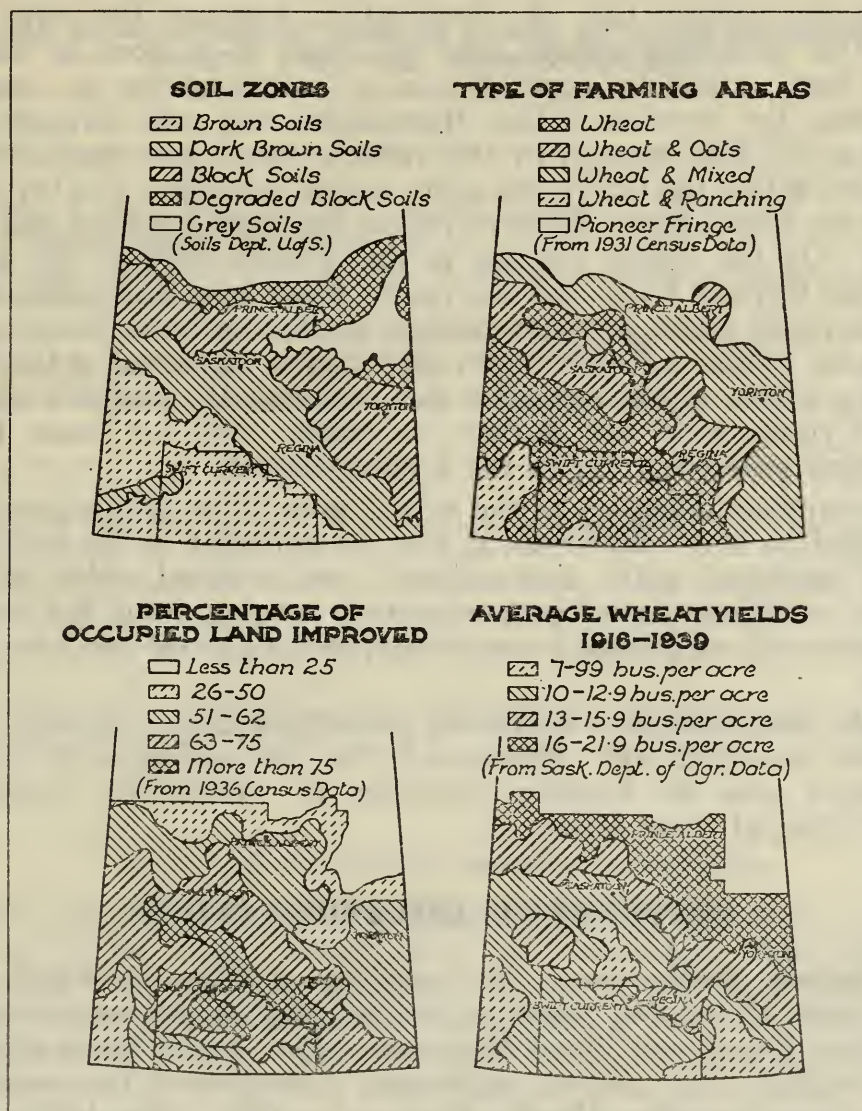


FIG. 2.—Nearly the entire surveyed area lies in the brown soil zone. Wheat growing is the predominant type of farming. Yields are relatively lower than in the other soil zones.

in the dark brown soil zone—the intermediate prairie region. Within each zone, soils have been given series names by soil technicians, which distinguish

⁴ Soil Survey of Saskatchewan, Report No. 10, Department of Soils, University of Saskatchewan.

their origin and to some extent their development. Thus, in the dark brown soil zone the "Regina" is of post-glacial lacustrine origin (lake bed deposit), the "Weyburn" of glacial origin, and the "Asquith" is derived from alluvial deposits, and so on; in the brown soil zone the "Sceptre" is of post-glacial lacustrine origin, the "Haverhill" of glacial origin, and the Hatton is derived from alluvial deposits. Though alike in origin, in structure and certain other characteristics, the Regina and Sceptre series differ in colour and to some degree in fertility. Their development under a slightly different climate and a natural vegetation associated with the climate, has accounted for these differences. These likenesses and differences are also associated with the Weyburn and the Haverhill, with the Asquith and the Hatton and with the other corresponding series in the different soil zones. Within corresponding soil series similar soil types are found. With the Regina and Sceptre series are associated the clay or heavy-textured soil types. With the Weyburn and Haverhill series are associated the loam or medium-textured soil types. With the Asquith and Hatton series are associated the sandy loams or light-textured soil types.

There is no definite line of demarcation between the two soil zones described. One gradually merges into the other in a more or less irregular transitional belt extending generally in a southeasterly to northwesterly direction across the province. This transitional belt cuts through the northeastern part of the area covered by this report. South and west of the Coteau, the area is well within the brown soil zone, and all soil series and types occurring in this zone are found here. However, there are more kinds of soil than these in the area. On the higher plateau in the western part of the area in the direction of the Cypress Hills, and also on the bench land of the Wood Mountain plateau, soils occur which are more closely related to those found in the dark brown soil zone. These soils have been described as belonging to the "Cypress" series. Owing to the higher elevation and consequently modified climatic condition, the Cypress soils are darker in colour and are more fertile than similar-textured soils occurring in the brown soil belt.

A more complete inventory of the soils is given later in this report and need not be enlarged on here. However, it may be said that in the soil mapping of the fifty-six municipal units, approximately one hundred series and types, or combinations of these, have been separated, ranging from the heaviest and most productive soil—the Regina heavy clay, to the lightest and least productive sandy soils.

While the foregoing gives a general description of the physical features of the land, there is considerable difference in the characteristics of these features from one small area to another, resulting in substantial variation in the agricultural value of these areas.

SETTLEMENT AND POPULATION

The Earliest Settlements.—The earliest settlements within this area occurred in parts of the two municipalities adjacent to Moose Jaw and a little later at Willow Bunch and Wood Mountain, which are in the southern part of the area classified. The former settlement accompanied the building of the main line of the Canadian Pacific Railway in 1882. The latter was far in advance of railway construction and for almost two decades little of this land was broken out—most of it being utilized for grazing.

Growth and Contraction of Population.—The first census (1901) recorded approximately 1,700 persons resident in the whole area, the population being dispersed between the north and northeastern sections, and the rest of the area in the ratio of two to one.

From 1901 to 1906 there was a fairly rapid increase in population in the northern part of the area, but during the following ten years to 1916 a very rapid increase in population took place throughout the whole area, particularly in the central part. Growth in population was marked for the period from 1916 to 1926 but it took place more slowly than during the preceding decade. The maximum number of persons living in the area was probably reached a year or so prior to the census year 1931, for which the census reports a population of over 113,000. From that time a decline took place, and by 1936 it was ten per cent less than reported for 1931. In 1936 the total population, rural and urban, in the area classified, amounted to approximately 10 per cent of that reported for the whole of Saskatchewan.

The growth and contraction of population by census year intervals for the northern, central and southern parts of the area classified are shown graphically in figure 3.

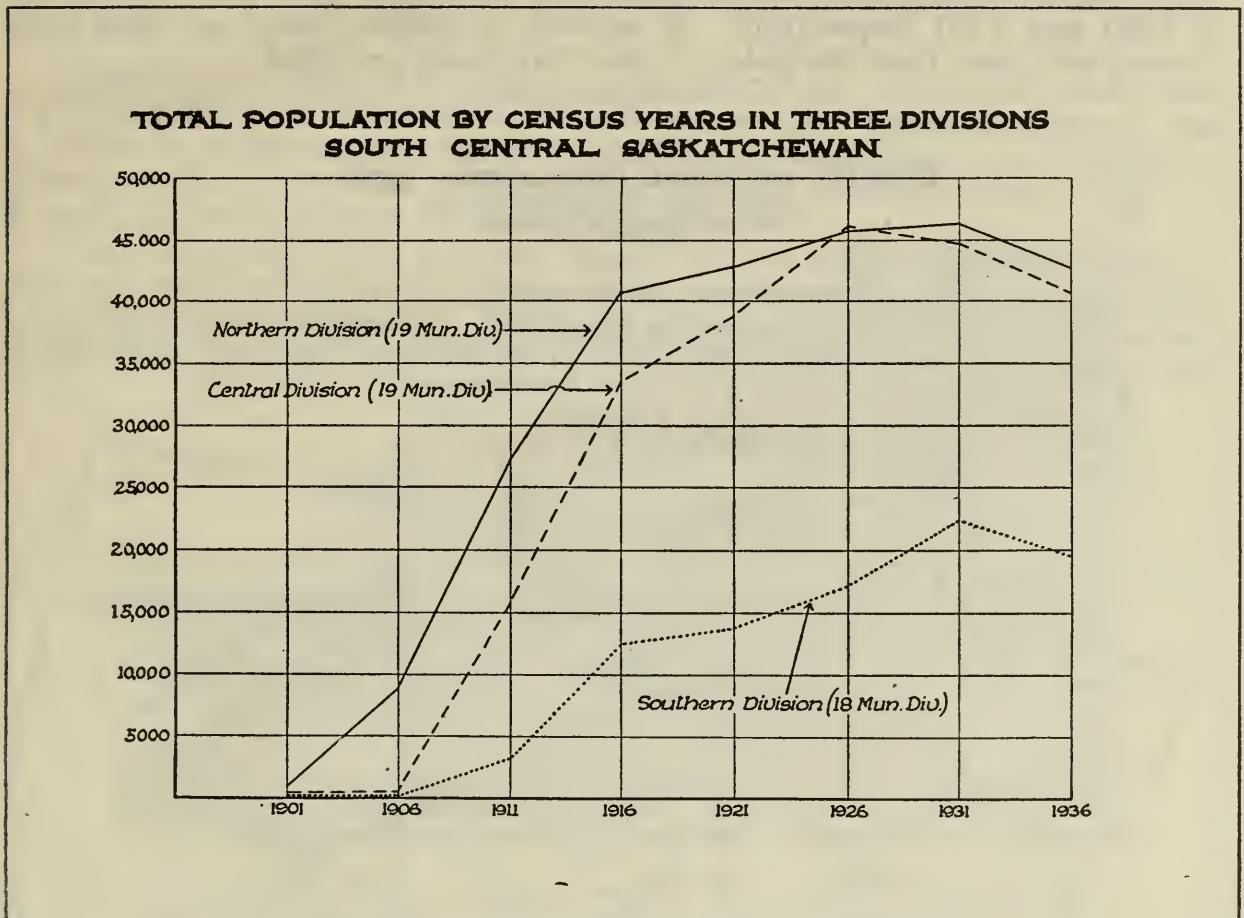


FIG. 3.—The Growth and Contraction of Population.

Reasons for Decrease in Population.—The earliest decrease in population occurred in the Rural Municipality of Brokenshell where the maximum was reached in 1911. The greatest decline was in the Rural Municipality of Chaplin where the population in 1936 was almost 40 per cent less than in 1916. Both of these municipalities comprise large areas of poor land, and the movement of the population is due in a large measure to the abandoning of this land. Abandonment accounts in part for the decrease in population for many other municipalities in the area classified. The rate of abandonment was accelerated by the dry period which followed the crop year of 1928.

The decrease in population has not been entirely due to the abandonment of the poorer land. Population has declined, but to a lesser extent, on better land because of the enlargement of individual holdings, a process encouraged by the prevailing type of farming and the number of successively favourable crop years prior to 1929.

DEVELOPMENT OF THE AREA

The growth of population in the main depicts, both as to time and place, the development of the area from prairie to farms, and the bringing under cultivation within a comparatively brief span of years over six and one-half million acres—approximately three-fifths of the total area comprised by the fifty-six municipal units. During this time five railway lines were built across the area from east to west; one line was constructed which intersects these from north to south, and one line skirts the territory to the east. Approximately two hundred shipping points with buildings and facilities for handling the major farm products have been established, and about sixty of these are fair-sized towns and villages with trading facilities to meet practically all the needs of farmers and tradespeople. In 1936, Swift Current, a city in the western part of the area, had a population of 5,074, and the two largest towns, Shaunavon in the southwest and Assiniboia in the central part of the area, had populations of 1,636 and 1,257 respectively. A network of graded roads has been constructed and more than 500 miles of these have been gravelled.

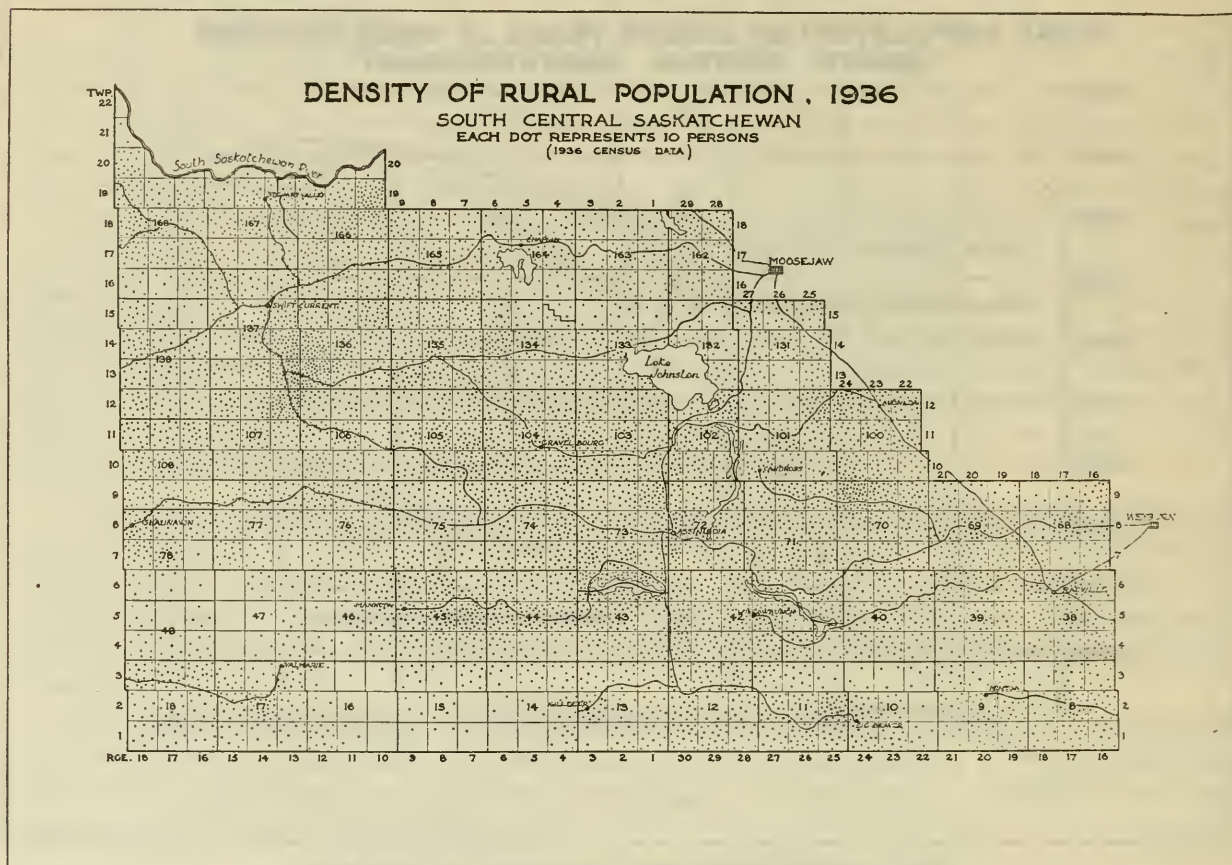


FIG. 4.—There is a fairly uniform distribution of population on land which is likely to stay in production. Marginal and submarginal areas are sparsely settled. The area is well serviced by railroads.

Early in the period of settlement municipal units were organized. Social services, schools, churches, community halls, and hospitals kept pace with the growth of settlement. Hundreds of miles of telephone lines have been built, and in a few of the larger towns electric power requirements are provided from provincial power lines. Throughout the more densely settled parts of the area, particularly on the better land, many fine farm buildings are to be seen.

Wheat Farming.—Wheat made this tremendous development possible within a quarter of a century, but following 1928, crop failures or low prices, or both, adversely affected the whole area in common with the greater part of southern Saskatchewan. In 1929 and every subsequent year up to and

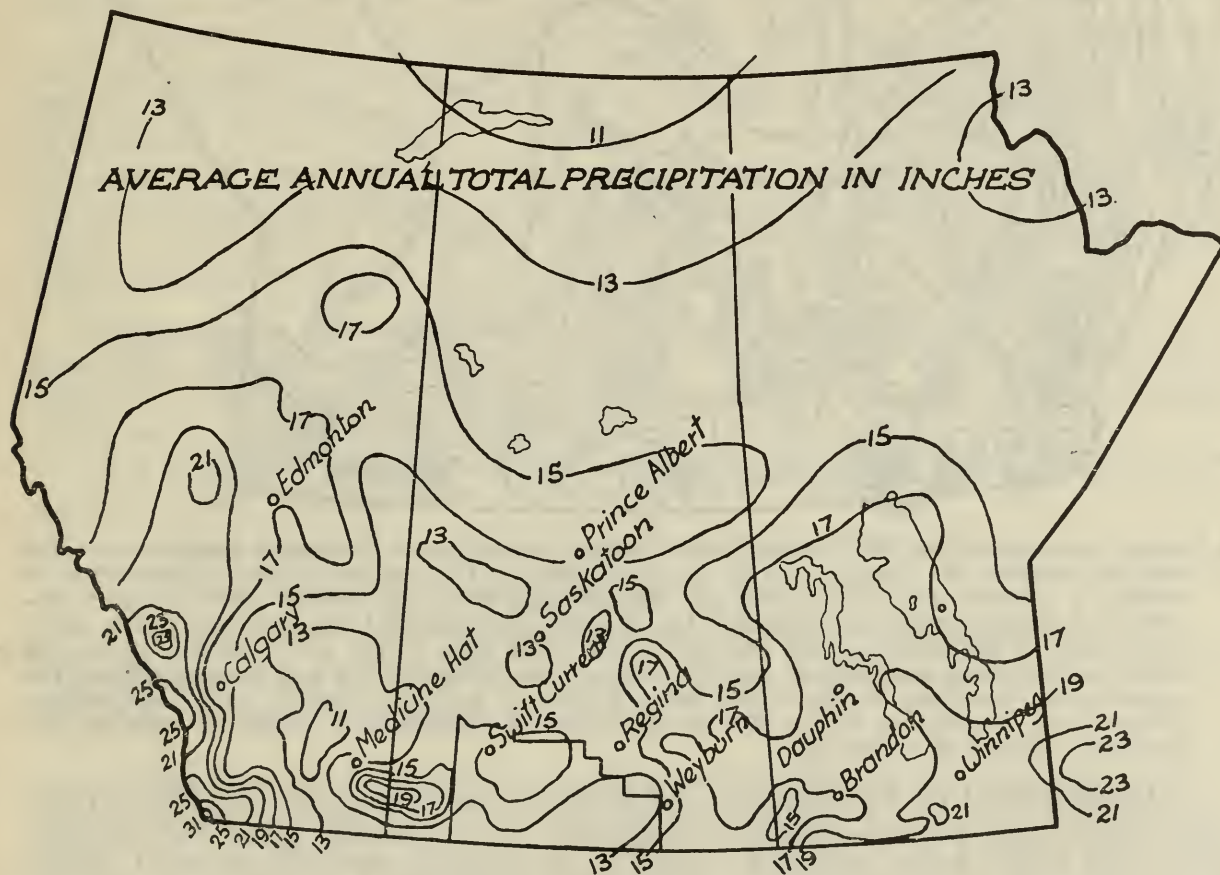
including 1938, partial or complete crop failures have occurred on most farms. With the exception of 1935 and 1938, when rust damaged a promising crop in varying degree, crop failures have been due to drought, though grasshoppers, which are usually associated with drought years, have also taken heavy toll. Each year since 1929, the people have had to depend more and more on outside aid for subsistence and maintenance of local services. As a consequence, buildings and equipment in rural districts and urban centres have deteriorated because of the lack of normal repairs and replacements.

The farms without live stock and live stock products sufficient for home use are in a decided minority; and many farms have been able to continue to produce a small surplus of live stock and live stock products for sale, particularly cream, during these unusually adverse years. But with 80 per cent of the farm income normally derived from the sale of wheat, the effect on the farms and urban centres, of any disaster to this major source of income may be readily understood.

Ranching.—North and west of Lake Johnstone and in the south and southwestern part of the area classified, there are a few wheat-ranch units, that is, farms on which ranching equals or approaches wheat growing in importance. These are situated in areas where the land is rough, or where although the land is level, the soil is inferior for grain production.

The attempt to carry the same number of live stock in the early drought years as was done during the years with favourable precipitation caused much of the land to be overgrazed. The result of this and the difficulty of obtaining winter feed was that stock had to be liquidated, often at sacrifice prices, and

FIGURE 5

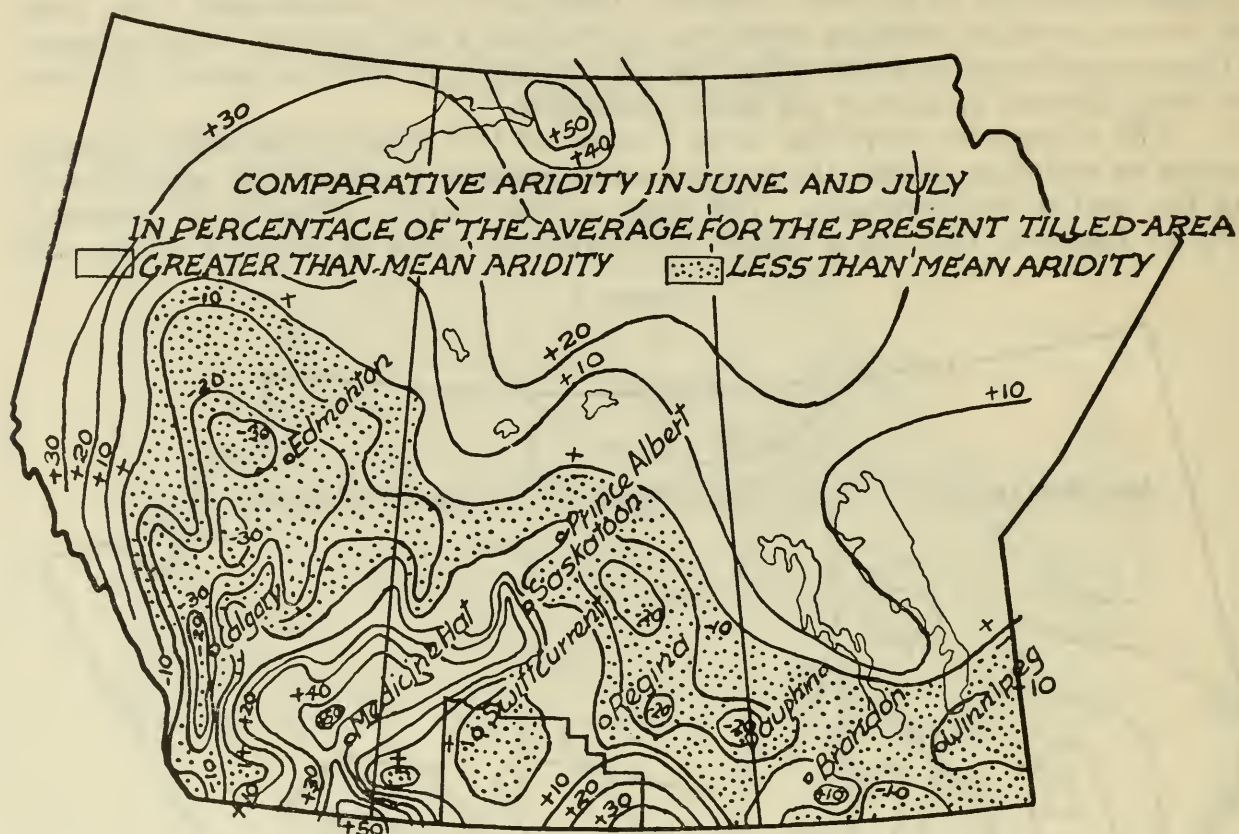


Generally 60 to 70 per cent of the annual precipitation falls from April 1 to August 21 and approximately one-half in June, July and August. There is considerable local variation in monthly proportions, but data indicate that there is a tendency for the maximum rainfall to be reached June 1 to June 15 in southern Alberta and southwestern Saskatchewan; from June 15 to July 1 in central portions of grain belt; and from July 1 to July 15 along the northern margin of the grain belt.

the semi-rancher and rancher found himself in a position little better than that of the wheat farmer. With the more favourable moisture conditions of 1938 and 1939 and fewer head of stock grazed, there has been a marked recovery of the grass.

Several Years of Favourable Moisture Conditions.—It is true that there were, during the settlement of this area, occasional years when partial or complete crop failures occurred because of drought, notably 1914 and 1919. Early settlers in the vicinity of Moose Jaw recall similar experiences in the years 1886, 1893 to 1895 and 1903, but previous to the last ten years this area was not considered as part of the “real” drought area of the Prairie Provinces. In fact there are a few farmers living in this area to-day who having been “dried out” in southwestern Saskatchewan and southeastern Alberta, settled after the war in this area where moisture conditions appeared to be more favourable. This belief would seem to have been justified by the information revealed in figures 5 and 5A, particularly with regard to comparative aridity in June and July.

Figure 5A



A graphic representation of the combined average variation of maximum temperature and average rainfall for June and July is given above. The regions where the tendency to aridity is greater than the normal, are distinguished from the regions where summer conditions average better, by shading. The map is differentiated by lines indicating equal increments or decrements of ten per cent of the mean value in the area generally cultivated at the present time and indicate only relativity. The “plus 40” line has been considered the approximate boundary of the driest belt. Figures 5 and 5A adapted from “Agriculture, Climate and Population of the Prairie Provinces of Canada”—A statistical atlas by the Dominion Bureau of Statistics.

Development in Retrospect.—An attempt has been made to farm certain lands which have proved definitely unsuitable for cultivation under the climatic conditions which have prevailed. This is the natural outcome of rapid settlement by people in the main accustomed to a different type of farming. Not by any means a large proportion of such land was broken up, but it was sufficient, particularly where the soil is light in texture, to create difficult problems in rehabilitating the area. For the purpose of recognizing the limita-

tions of such land, putting it into its proper use, for the reorganization and equalization of the burden of the costs of community service, for the adjustment of debts and for the solution of other economic and social problems, an economic classification of the land is fundamental.

BASIS OF CLASSIFICATION

The basis of the classification of land in this plains region of Saskatchewan presented in this bulletin is the estimated potential productivity of quarter-sections of land in terms of wheat production.

Wheat is a hardy plant. It is capable of withstanding to a greater degree than most other crops, the ravages of wind, drought and extreme changes in temperature experienced in a plains country with a continental climate. The climate of such a region is conducive to the production of a high-quality wheat. In regions far removed from consuming centres, where the land and climatic conditions are suitable, wheat, a concentrated product, occupies an advantageous position in competition with other crops.

In the prairie region of Saskatchewan the production of wheat has predominated for a long period of years. It has returned more net income per acre than any other type of farming on most of the land. For these reasons it does not appear that the type of farming now found in the area discussed in this report will change materially; and even should some change occur—such as an increase in the production of live stock—wheat will continue to be the main source of revenue for years to come. Suitability and capacity for wheat production has therefore been taken as the basis for classifying this land.

However, as just intimated, some of the land in the area—a substantial part in fact—is not best suited to wheat production. Furthermore there are great variations within the lands that are adapted to wheat production. Failure to recognize these differences in the past has prevented the most effective use being made of these lands. The purpose of this study supplementing as it does the soil survey and other investigational work, is to differentiate between these lands, to give them a productive rating that will have a definite meaning and furnish a basis for their more effective use in the future.

Designation of Land Classes.—Briefly stated the classification consists of appraising quarter sections of land in the light of all relevant physical and economic information available—the greatest weight being given to the history of the past productivity of such land.

For simplicity in interpretation the classification has been confined to five general classes, namely:—

Land Class I—submarginal for wheat production.

Land Class II—marginal for wheat production.

Land Classes III, IV and V—suitable for wheat production.

Thus the class into which a parcel of land has been placed indicates the degree of its utility for wheat production.

Limitations of Production on Marginal Wheat Land.—In this classification land that is marginal for wheat growing is land which because of its location, character and record of production would, if operated with average managerial ability, in a unit of average size and typical organization, be expected to pay expenses—including depreciation and taxes—and provide a living for the operator and his family. It would not yield sufficient to pay for the use of land either as rent or interest.

To provide such an income in the central part of the area classified, and on a three-quarter-section farm—which is the average for the area, excluding ranches and semi-ranch units—farm management studies⁵ have indicated that a range of 1,050 to 1,425 bushels of wheat must be sold annually. This is in addition to the income received from minor sources of revenue such as live stock, live-stock products, and so forth, of all the kinds and amounts usually found on these farms.

The lower limit of the range for marginal land, 1,050 bushels of wheat available for sale, is premised on the operator of such a farm accepting the equivalent of a hired man's wages for cash costs of living. Although the usual yearly wage for farm help in Saskatchewan is not sufficient to give a farm family of average size an adequate standard of living, it was assumed that a farmer would hesitate to give up such a farm business if he could get hired man's wages. The upper limit of the range for marginal land, 1,425 bushels of wheat available for sale, allows the average living standard of a typical Saskatchewan farm family as determined in farm management surveys. Farm living costs in Saskatchewan, receipts from farm products, costs of farm operation and hired man's wages were computed on a 1922 to 1929 price level.

While a farm unit of the average size in the area has been used in determining what constitutes marginal land for wheat production, the unit⁶ of the classification is a quarter-section of land. Hence on a quarter-section basis the range of marginal land for wheat production is from 350 to 475 bushels⁷ of wheat available for sale on an average usually, or one-third of the total available for sale from a farm of average size. As a first approach in the classification, quarters whose potential productive capacity comes within this range have been placed in Land Class II.

Limits of Production in Other Land Classes.—It follows then that in this first approach to the classification by using the potential productive capacity of the land the ranges in terms of wheat bushels available for sale in the other land classes are below or above the range established for Land Class II. Quarter-sections not capable of producing more than 350 bushels of wheat available for sale were placed in Land Class I. An average size farm made up of such parcels farmed under similar conditions to those described in the foregoing, is sub-marginal for wheat production. From a farm unit so described, one could not expect over a period of years to realize sufficient income for the maintenance of the business without a serious reduction in living standard, even assuming as with the "marginal farm" on Land Class II that no charge is made for the use of land. Quarter-sections capable of producing more than 475 bushels of wheat for sale on an average annually were considered as definitely suitable for wheat production. Such land in a unit of average size is capable of returning more than that established for a marginal farm in wheat production. From a farm unit so described, one could expect over a period of years to get sufficient income

⁵ Farm management and farm business studies have been conducted in Saskatchewan by the Department of Farm Management at the University of Saskatchewan since 1926. Reports on these projects have been published from time to time. Data used in arriving at what constitutes a "basic marginal farm for wheat production" were provided by the Scott, Wellington and Brokenshell study of 1932, Extension Bulletin No. 65, University of Saskatchewan, the Kindersley and Turtleford studies, 1929-1930, the Davidson Area study, 1930-1931 (the latter three unpublished), and by the initial study in land classification conducted by the Dominion Economics Division and the Department of Farm Management, University of Saskatchewan, entitled "Physical and Economic Factors Related to Land Use Classification in Southwest Central Saskatchewan," Technical Bulletin No. 15, Dominion Department of Agriculture.

⁶ A more complete discussion of the use of the quarter-section as a unit for classification will be found on pages 29 to 30.

⁷ Approximate range used in central part of the area classified. Due to differences in freight rates, the upper and lower limits used for Land Class II, in the eastern part of the area were 10 bushels less, and in the western part were 10 bushels more. Bushels available for sale annually required for other land classes varied accordingly.

for the maintenance of the business, a reasonable standard of living and a surplus either to pay for the use of the land, or for payment of interest and principal on land indebtedness. Of this land, definitely suitable for wheat, three classes have been designated in the classification, namely, Land Classes III, IV and V. The range used for delimiting Land Class III was from 476 to 720 bushels of wheat per quarter-section; for Land Class IV from 721 to 900 bushels of wheat per quarter-section; and for Land Class V over 900 bushels of wheat available for sale on an average annually per quarter-section. The establishment of a "productivity rating" for each quarter-section, in relationship to the average quarter of the three-quarter-section marginal farm, served as the first approach to the classification of the land.

Modification of Productivity Ratings in Final Classification.—Quarter-sections or parcels, even assuming a farm of average size, vary however in the economy with which they may be farmed on account of (1) a difference in physical characteristics and (2) the greater variability from year to year in yields which may be expected from one quarter consisting predominantly of one soil type as compared with another quarter. Therefore, in further study toward a final classification, these factors were taken into consideration, with the result that many parcels which were near the lower limit of the productivity rating for a particular land class were placed in the next lower land class.

In addition to the foregoing, in arriving at a final classification of the land other criteria were used. Progress toward permanent settlement and reasons for success or apparent failure as revealed in present occupancy or abandonment were given careful consideration. Failure of settlement directly attributable to the quality of the land or its location resulted generally in a relatively low rating of the land in the particular district where considerable abandonment had taken place. This was particularly true in districts where more than the usual amount of abandonment had taken place in the earliest years of settlement.

Interpretation of the Classification.—It should be observed that in this area while wheat production, because of its importance in the economy of the whole area, is the basis of this classification, the land has other agricultural uses than those described. A considerable amount of the land in Land Class I is used for grazing. This is probably the best use for such land. When so used, such land offers an opportunity for economy in the production of a product (cattle or sheep) which makes possible the return of more net revenue over a period of years than wheat production. This is also true but to a lesser extent of land in Land Class II. Some sandy to fine sandy loam parcels in these two classes have been used to advantage in the production of fall rye and there is increasing evidence that a tenacious nutrient grass, such as crested wheat grass, may be grown on this land, thus enhancing the value of the land when utilized for an occasional feed crop as well as for grazing. However, on land in both these classes, for the average operator to obtain a surplus above that required for the maintenance of the farm business, more land is required than the unit of average size in the area.

Land in Classes III, IV and V is suitable for wheat production, and though differences exist among the various parcels making up each of these classes, such as to warrant finer gradations within each class, and also a shading from one established class to another, the simple classification in itself gives a general picture of the capacity and limitations of such bodies of land. If in the future a more profitable use of the land is discovered it is more than probable that the present classification will reflect, with reasonable accuracy, the relative productivity of such land in the new use.

Summary of Basis of Classification.—To sum up, in this classification, land has been rated on its suitability for wheat production; the pivot of the classification is the land placed in Land Class II. Land Class II contains parcels of land limited by soil, other physical features and location in respect to more than average crop hazards from which an operator of average ability cannot expect annual revenue more than that required to meet cash family living costs and farm maintenance charges when operating a unit of average size and typical organization for the area classified. Hence this land is considered marginal for wheat production. Farmed under similar conditions Land Class I can be expected to produce less and is submarginal for wheat production; the other Land Classes III, IV and V can be expected to produce more and are therefore considered to be above the margin for successful wheat production, the higher numerals indicating better grades of land. The rating on its potential productivity, however, has been subjected to modifications, on the basis of other criteria, in arriving at a final classification of the land. The unit of classification is the quarter-section. The means of arriving at the productivity rating by quarter-sections as well as a discussion of the other criteria used in the final classification is given in other sections of this report.

GENERAL PROCEDURE

Assembling the Data.—In the field work observations were recorded for every quarter-section of land as to occupancy, ownership, tenure, period of occupancy, if abandoned, land-cover, present state of cultivation, description of buildings, and the physical characteristics not noted in the reconnaissance soil mapping of the area. Approximately one-half of the farmers throughout the whole area were visited. They co-operated in providing pertinent information concerning the organization of their farms and results of their farming operations for the particular parcels of land in the farm unit. During the four years in which the surveys were carried on, more than 4,300 farmers provided information which was felt to be sufficiently reliable to use in determining the wheat yield experience for a sixteen-year period 1921-1936⁸ according to the type of soil and location of the farm.

Municipal councillors, secretary-treasurers of the Rural Municipalities and others assisted greatly in providing information as to the past history of unoccupied land and that occupied by those who recently moved into the district. From the records at the municipal offices was recorded information on assessed ownership and values, tax delinquency, as well as information on agricultural and direct relief. Use was made of aerial photographs in both field and office work.

Use of Aerial Photographs in Land Classification.—Aerial photographs⁹ of the area reported on herein were taken by the Royal Canadian Air

⁸ In the seven municipalities covered in the 1936 survey, viz. Rural Municipalities 38, 39, 40, 68, 69, 70 and 71, estimates on wheat yields were obtained for a fourteen-year period, 1922-1935 only; to make these comparable with the wheat yield averages calculated from information obtained in the surveys of the three subsequent years, they were adjusted to sixteen-year averages, by using the municipal averages of 1921 and 1936 provided by the Secretary of Statistics, Saskatchewan Department of Agriculture.

⁹ In this area two types of photography were used, the oblique and the vertical. In the oblique photographs, reproductions of which appear in this report illustrating different land types, the cameras were placed so that the optical axes were inclined at an angle to the ground plane and hence all horizontal lines vanish at the same point on the horizon. These give a bird's eye view of a fairly large area, but with 10 to 14 photographs per township practically every section appears at least once in the foreground of a picture. In the vertical photographs the cameras were placed so that the optical axes were directed at right angles to the ground plane and images of the objects appear in true plane. The verticals cover less area in a picture but in the vertical photography used on the prairies there are from 24 to 30 photographs per township. More detail may be observed in the verticals and they serve more purposes than do the obliques.

Force in the fall of 1937 and during the early summer and fall of 1938. When used in conjunction with the soil mapping these photographs were an exceedingly valuable aid for mapping the necessary detail of the physical description of the land. The cultivated pattern, pot-holes, sloughs, ravines, drainage ways, eroded parts, drifted sand, farmsteads and other features are plainly visible to the trained worker. To a limited extent the aerial photographs permit the observation of contrasting land features over several sections at one time, and permit the mapping of these features with more accuracy as to location and with a saving of time in the field work.

Estimating Potential Productivity per Quarter-Section.—In rating a quarter-section of land on its suitability for wheat production the two important factors which have been considered are: (1) the estimated annual yield of wheat per acre, and (2) the number of acres of arable land per quarter-section.

The productivity rating for each quarter-section was obtained by multiplying the assumed annual acreage of wheat per quarter-section by the estimated district average long-time yield of wheat per acre (less 1.5 bushels for seed and farm use) for the predominant soil type of the particular quarter-section.

A study of the trend in the utilization of the land in this region indicates that of the land which will probably remain in or be brought into cultivation, about 45 per cent will be used annually in the production of wheat for sale; the remainder will be either fallowed or used in the production of crops other than wheat, including additional wheat acreage cut for fodder. For this reason in determining the probable amount of wheat available for sale it was assumed that 45 per cent of the potential arable acreage in each quarter-section will be seeded to wheat.

Classifying the Land.—Having rated each parcel on its potential productivity, a tentative classification was then made by delimiting areas containing parcels within the ranges of productivity ratings established for the various land classes. The next step was to re-examine the mapping of the physical description of the areas so delimited, as well as the history of their development, and in the light of this information, make whatever adjustments appeared advisable to the land class boundaries denoted in the tentative classification. Following this, further observations in the field were made in order to check the tentative land class boundaries. At this stage the map which accompanies this report was prepared. The map is intended to portray what might reasonably be expected of the land in south central Saskatchewan in wheat farming, the type of farming best adapted to the whole area.

PROPORTION OF TOTAL AREA IN DIFFERENT LAND CLASSES

Of the fifty-six municipal units comprising forty-eight organized rural municipalities and eight local improvement districts, 39.3 per cent of the land has been graded as Land Class I, submarginal for wheat; 18.3 per cent Land Class II, marginal for wheat; and 42.4 per cent in Land Classes III, IV and V, definitely suitable for wheat production (table 1).

TABLE 1.—ACREAGE AND PER CENT OF TOTAL LAND AREA¹ IN EACH LAND CLASS, FIFTY-SIX MUNICIPAL UNITS, SOUTH CENTRAL SASKATCHEWAN, ECONOMIC SURVEYS 1936-1939

Land Class	Acres	Per cent
I.....	4,532,426	39.3
II.....	2,117,885	18.3
III.....	3,304,773	28.6
IV.....	1,381,409	12.0
V.....	206,294	1.8
Total.....	11,542,787	100.0

¹ Does not include 13,009 acres in irrigation block of Local Improvement Districts Numbers 47 and 17 (Val Marie Project), 5,760 acres in Indian Reservation Rural Municipality 44 and 10,200 acres in Dominion Animal Quarantine Reservation Local Improvement District 43.

AVERAGE WHEAT YIELD IN SOUTH CENTRAL SASKATCHEWAN

Average Wheat Yields by Soil Types.—It is common knowledge that on the prairies under dry-farming conditions the heavier-textured soils may be expected to produce more than soils of lighter texture. That is, the clays will yield more than the loams and the loams more than the sandy loams. Apart from rough and stony land or low-lying and poorly-drained land the farmers' description of "good", "medium" and "poor" land is explained largely in the differences of soil texture. Barring hazards such as rust, grasshoppers or hail the farmer knows that he can expect higher yields from a clay soil than from one of a sandy loam texture. This explains why competition is much keener for well drained land of clay-textured soils.

For a productivity rating of the soils however it is not enough to recognize in a general way that in a district one soil type may be expected to yield more than another, but, what is required is a statistical measure of what these yields are likely to be over a period of years for the different soil types under usual farming practices.

Although not without some limitation, the only basis for estimating yields which may be expected in the future is the record of past performance over a sufficiently long enough time to ensure that similar results may be obtained over a reasonably long period in the future. Some allowance must be made, however, for changes in cultivation practices which have taken place and changes in fertility since the land was first brought under cultivation.

In the economic land classification of south central Saskatchewan a productivity rating for the soils in different districts has been arrived at by a statistical study of the wheat yield histories of over 4,300 farms located on the various soil types throughout the area classified.¹⁰ The information assembled on wheat yields covered a sixteen-year period (1921-1936), eight relatively good years (1921-1928) and eight poor years (1929-1936). For this sixteen-year period averages were computed for the different soil types, and for the same soil types in the different districts making up the area. These averages, with adjustments made for extreme variability in the yields for certain soils from the earlier years to the later years, were the basis for the estimated long-time average yield of wheat on a soil type, and for similar soil types in different districts.

As already mentioned the available soil survey mapping uses approximately one hundred different soil series and types and combinations of these in the soil maps of the fifty-six municipal units reported on herein. While physical

¹⁰ See Appendix C for method of obtaining history of wheat yields.

and other differences exist to warrant these separations by the soil technicians for a general presentation of the long-time average wheat yields by soils, the soil types may be conveniently grouped into fewer separations. This has been done mainly according to broad divisions of soil texture, and the sixteen-year averages for these soils groups are presented in table 2.

The yield histories used in this general presentation of long-time wheat yields by soils are confined to farms within the brown or short-grass soil zone in thirty-eight municipal units (Fig. 2.) The farm wheat yields in the other eighteen municipalities west of this block also largely within the brown soil zone are not included, but are referred to later. The yield of wheat on the

TABLE 2.—AVERAGE YIELD OF WHEAT BY SOIL GROUPS WITHIN BROWN SOIL ZONE FOR 38 MUNICIPAL UNITS IN SOUTH CENTRAL SASKATCHEWAN 1921-1936

Soil groups ¹	Average yield of wheat per acre	No. of farm records
	(bushels)	
1. Sandy loam and gravelly sandy loam.....	8.1	74
2. Fine sandy loams to light loams.....	10.5	270
3. 'Blow-out' loams and alkaline soils.....	10.5	106
4. Loams and silt loams.....	11.4	920
5. Clay loams and silty clay loam.....	12.1	1,307
6. Mixtures of clay and clay loam.....	12.4	120
7. Silty clays and clay.....	13.4	105
8. Heavy clays.....	14.6	82

¹ Includes all series found in brown soil zone except Cypress.

farms in these eighteen municipalities are not included in showing the general relationship between soil texture and yield for two reasons. Large areas of Cypress loam, which is darker than the soils usually found in the brown soil belt, cut into this block of eighteen municipalities. Damage from rust in the past was reported less frequently in this part of the area than in the eastern and central parts comprising the thirty-eight municipal units.

The average yields for the sixteen-year period given in the foregoing table require no extended comment, but a few general observations revealed in the analysis of the data from which the table is constructed are worthy of note. From 1921 to 1928, the differences between the yields of the heavier and lighter soils were relatively less than they were during the drought period of 1929 to 1936. Crop hazards affect yields on all soils; rust and early fall frosts are likely to affect the yield on the heavier land more adversely than on lighter land. In south central Saskatchewan over a period of years moisture efficiency is relatively low, small variations below normal in this respect usually cause low yields on light soils, but the heavier soils are not affected to the same extent. For the period 1929-1936 when drought accounted largely for the marked decline in yields, the average yield was but 25 per cent of that of the 1921-1928 period on the fine sandy loam soils as compared with approximately 50 per cent on the heavy clays.

Even with a return of better moisture conditions, it seems probable that relatively lower yields may be expected than were obtained on the sandy loams on the average during the eight good years from 1921 to 1928; while on the heavier soils the yields may be maintained fairly well. In this connection the wheat yields obtained for the year 1939 on the sandy loam, loam and clay soils in the Rural Municipality of Pittville No. 169, are indicative. This municipality is adjacent to and west of the block of fifty-six municipalities

classified. These yields, along with the average yields on the same soils in the district of which the municipality forms a part, for the periods 1921-1928 and 1921-1936 are given in table 3.

TABLE 3.—AVERAGE YIELDS OF WHEAT BY SOIL TYPES IN RURAL MUNICIPALITY OF PITTVILLE 1939 AND IN THE DISTRICT FOR THE PERIODS 1921-1928 AND 1921-1936

Soil types	Average wheat yields		
	R.M. Pittville 1939	District	
		1921 to 1928	1921 to 1936
	(bushels)	(bushels)	(bushels)
Hatton, fine and very fine sandy loam.....	12.2	14.7	10.5
Fox Valley, loam and silt loam.....	18.8	16.9	12.5
Fox Valley, silty clay loam.....	20.9	16.5	12.4
Sceptre, clay and heavy clay.....	21.8	18.2	14.7

In 1939, on the light soils (Hatton fine and very fine sandy loam) in the Rural Municipality of Pittville, the average wheat yield at 12.2 bushels per acre was 17 per cent less than the average for the eight-year period 1921-1928 in the district of which the municipality forms a part; whereas in 1939 on the medium to heavy soils in the same municipality the average wheat yields were 11 per cent or more, greater than the average yields for the eight-year period in the same district. In this district during 1939 climatic conditions for the production of a crop were about the most favourable ever experienced—in any case much better than had been experienced in any year since 1927.

On the basis of this evidence it appears reasonable to expect that the difference in the average yields between the lighter and heavier soils for the next sixteen-year period will be even more marked than during the sixteen-year period 1921 to 1936.

Average Yields Vary on Same Soil Types in Different Districts.—The yield figures presented in table 2 are averages for the soil groups over a fairly extensive area, and hence variations in average yields occurring in the same soils from one district to another within this area are smoothed out. However, it was found that there are significant differences in the average long-time yield for any one soil type in one district when compared with the same soil type in another district. There are, of course, variations in the long-time yield between farms in any district on the same soil, but these may be due in part to difference in farming practices. Differences in yields due to individual farming practices are smoothed out when a large number of yield records are used in computing the average. In the averages quoted in the following for the same soil type in different districts, a minimum of 40 yield records, except where noted, have been used in arriving at the average quoted.

Soil types described as Haverhill loam and Haverhill clay loam cover a large part of the thirty-eight municipal units from which yield experience was described in the general presentation of "long-time yields by soil groups." Confining the analysis of wheat yield experience to records from farms located in districts with comparable hail liability, it was revealed that the sixteen-year averages of wheat yields for the same soil types were higher in the central and western districts than in the eastern within the block of thirty-eight municipal units. This is shown in table 4.

TABLE 4.—AVERAGE WHEAT YIELDS OF THE MOST COMMON SOIL TYPES FOR THREE DISTRICTS OF SOUTH CENTRAL SASKATCHEWAN HAVING SIMILAR HAIL RISKS 1921-1936

	Number of records		Average yield per acre	
	Soil type		Soil type	
	Haverhill loam	Haverhill clay loam	Haverhill loam	Haverhill clay loam
Eastern.....	90	344	10.9	11.6
Mid-eastern.....	48	304	11.4	12.4
Central.....	100	213	11.8	13.4

Further illustrations of the differences in the long-time yield for the same soil type in different districts are noted when the wheat yields from the eighteen municipalities west of this block of thirty-eight are considered. Haverhill loam soil extends over a fairly wide area in these eighteen municipalities. On this soil type the sixteen-year average yield in the western district was 12.5 bushels, which it will be noted is higher than reported in table 4 for the three districts farther east.

Another soil type described as Cypress loam occurs in a district near the southeastern part of the area classified and also in a fairly large contiguous block on the western side of the area classified. The long-time average yield on the Cypress loam in the eastern district was 9.9 bushels; on the same soil type in the western district the average yield was 13.1.

For the same sixteen-year period the average yield of wheat on the Hatton fine sandy loam in the eastern districts of the classified area was 8.9, in the western districts 10.2. Average wheat yields on the "blowout" loams of the eastern part of the area when compared with the western part indicated similar differences. During the sixteen-year period in the western part of the area, heavier-textured soils also showed a tendency to higher yields per acre than in the eastern part of the area.

Cause of Variation in Wheat Yields.—While the purpose of the foregoing is to point out by a few examples the importance of the "location factor" as well as the soil factor, it may be advisable to offer a possible explanation for the higher yields apparent over the sixteen-year period in the western part of the classified area. It must be noted that the western boundary of the area classified and reported on herein is 70 miles east of the Alberta border and also east of the Great Sand Hills. It does not include the larger part of the country which is generally referred to as southwestern Saskatchewan.

Since moisture is a very important factor in the production of a crop in southern Saskatchewan, a possible explanation may be found here. Although adequate climatic data in the classified area over sufficiently long periods are not available, a general observation may be noted in a study of figure 5A already referred to, particularly the graphic illustration of "comparative aridity in June and July."

As observed before, in this area the height of land rises towards the west forming a fairly expansive plateau 2,800 to 3,000 feet above sea level. This is part of the eastern extension of the Cypress plateau. To the west of this and about thirty miles distant beyond the western boundary of the area classified in the central region, are the Cypress Hills where the elevation in places is over 4,000 feet above sea level. The soil and vegetation on this plateau indicate more favourable moisture conditions and it may be that the influence of this plateau extends to the surrounding country to the east; but this is partly offset by the drying effects of Chinook winds, which are more generally experienced in this part than farther east.

No doubt the occurrence of rust during the sixteen years was also partially responsible for the lower yields in the eastern district compared with those in the western district. In one year, namely 1935, the wheat yields were more adversely affected by rust in the eastern part of the area classified than in the western part. Rust was also reported in 1923 and 1927 but did less damage in this area than in southeastern Saskatchewan, and yields were relatively high in both of these years over the whole area classified. Just how much difference rust has made in lowering the sixteen-year average yield in the eastern part compared with the western part can only be approximated. For the three years, namely, 1923, 1927, and 1935, in which rust was reported, the average wheat yield in the western part of the area classified was about two and a half bushels higher than in the eastern part, which if accepted as a measure of the average decrease in yields due to rust in the eastern part of the area compared with the western, would amount to one-half bushel difference in the sixteen-year average. This statement, however, assumes that yields in the eastern and western parts of the area would have been the same if there had been no rust during the three years rust actually was reported.

Both aridity and crop hazards such as rust and hail contribute to differences in yields on the same soil as between districts and there may be other reasons found even in the land itself if it were practical and possible to carry the soil separations far enough and to study other physical differences such as topography, drainage and so forth in more detail, particularly in relation to the yields secured by farmers.

Effect of Hail Hazard on Average Yields.—The “location factor” is also important from the standpoint of hail hazard.¹¹ On any one soil type situated within two districts of unequal hail hazard the difference between the long-time average wheat yields may be as much as one bushel per acre.

Some districts in Saskatchewan are more subject to crop losses from hail than others. The probability of hail losses for each district has been determined by hail insurance companies as a result of experience in writing hail insurance in the province for more than two decades. Premium rates vary according to the hail risk. To administer the hail insurance business the companies have divided the province into zones according to the risk entailed. The area under review consists of zones which might be described as low, medium and high risk areas.

Table 5 presents the average yields 1922-1935 for the medium and high risk zones of seven municipalities in the eastern part of the area for three important soil types in these zones. Only these two hail risk zones occur in these municipalities.

TABLE 5.—AVERAGE WHEAT YIELDS FOR TWO HAIL ZONES IN SEVEN MUNICIPALITIES OF SOUTH CENTRAL SASKATCHEWAN BY SOIL TYPES 1922-1935

Soil type	Number of records hail risk zone		Average yield per acre hail risk zone	
	High	Medium	High	Medium
	number	number	bushels	bushels
Haverhill loam.....	22	90	10.5	11.2
Haverhill clay loam.....	159	344	11.1	12.0
Haverhill clay loam and Sceptre clay mixed, and Sceptre clay	29	48	12.6	13.4
	210	482	11.2	12.0

¹¹ In the discussion of long-time average wheat yields by soil types within different districts, due to one district being more favourably located for moisture, the records used were in districts fairly comparable for hail hazard, as indicated by the hail premium rates charged.

Average Long-time Yields in Relation to Land Class.—To the casual reader, one-half bushel, or a bushel to the acre difference between the average wheat yields on land in one district as compared with that in another district, or on one soil type compared with another, may seem a trifle. The average sized farm in the area is three-quarters of a section or 480 acres. Assuming that 400 acres are cultivatable and with 45 per cent of this available each year for wheat, there would be 180 acres in wheat. For every increase of one bushel in yield the total production of the farm would be increased by 180 bushels per annum. The average farm price for wheat over the sixteen-year period 1921-1936 in the central part of the classified area was 80 cents. At 80 cents per bushel 180 bushels would mean an additional gross return of \$144 on an average each year over the sixteen-year period. The expense of harvesting this extra bushel would be small; if it were combined, which is becoming the usual method of harvesting in the area, the extra cost would be almost negligible. The extra annual revenue from the one bushel per acre would be approximately enough to pay the interest on a \$2,400 mortgage ($\frac{\$144}{6} \times 100$). Thus it will be seen that a difference of only one bushel per acre in the long-time average wheat yield may make the difference between a farm unit in Land Class II and one that has sufficient surplus to service a considerable amount of indebtedness.

PHYSICAL DESCRIPTION OF LAND CLASSES

It was pointed out, in the general description of the physical characteristics of the area, that there may be considerable variation from one small area to another making the agricultural value within the area considerably varied. For this classification which attempts to give a rating of the agricultural value of a unit as small as a quarter-section, differences which occur in the physical characteristics were mapped in considerable detail. Detail on the topography, soil, occurrence of stones, of waste and of the amount in cultivation provided a basis for estimating the arable acreage of each quarter-section; and this along with the history of its past performance or the history of the past performance of land physically comparable in the district was used to determine the economic rating given to the quarter. Illustrations of the land classes will be found facing page 22.

Soil and Topography.—An inventory of the soils of the area separated into broad groups, the distribution of this inventory by land classes, and the relation which topography bears to this distribution appears in table 6. This inventory and the associations as revealed in this table expressed in acres and percentages, have been worked out from the field description of each quarter, and while an individual quarter may vary from one boundary to the other in soil and other physical characteristics, the predominant physical description which applies to a quarter-section has been used in its descriptive rating.

It will be noted that lighter soils (Groups I and II) fall in the lower land classes—approximately 97 per cent of sandy loams, falling in Land Class I; the heavier soils, where the topography is level to gently rolling are found in the higher land classes. The rolling and hilly lands fall in the lower land classes.

TABLE 6.—PROPORTION OF VARIOUS SOIL GROUPS WITHIN EACH LAND CLASS, ACCORDING TO TOPOGRAPHY, FIFTY-SIX MUNICIPAL UNITS, SOUTH CENTRAL SASKATCHEWAN, ECONOMIC SURVEYS 1936-1939

	Soil groups ¹							
	I	II	III	IV	V	VI	VII	VIII
Per cent of total acreages.....	3.7	10.2	14.6	7.9	33.5	22.8	4.7	2.6
Total acreage (000 omitted).....	433	1,181	1,681	918	3,862	2,633	538	297
	%	%	%	%	%	%	%	%
<i>Land Class I—</i>								
Level to undulating.....	39.1	10.2	1.2	35.4	0.9	0.8	10.2	0.4
Gently rolling.....	33.0	9.2	4.3	9.9	3.3	1.4	2.0	0
Rolling.....	24.7 ²	15.8	19.5	3.9	16.7	8.5	3.8	0.3
Steep and hilly.....		4.3	66.6	0.2	7.3	7.0	0.8	0.1
	96.8	39.5	91.6	49.4	28.2	17.7	16.8	1.0
<i>Land Class II—</i>								
Level to undulating.....	2.3	14.4	0.8	19.6	2.7	1.6	4.0	1.5
Gently rolling.....	0.9	18.6	2.6	10.3	10.7	7.1	4.1	0.7
Rolling.....		4.5	2.2	0.9	6.6	5.7	3.4	0.8
Steep and hilly.....		0.3	1.4	0.1	0.5	0.5	0.4	1.0
	3.2	37.8	7.0	30.9	20.5	14.9	11.9	4.0
<i>Land Class III—</i>								
Level to undulating.....		10.7	0.3	13.6	18.8	13.7	17.6	5.6
Gently rolling.....		11.6	0.7	6.0	22.3	21.5	11.2	4.5
Rolling.....		0.2	0.3	0.1	1.4	2.7	1.6	0.9
Steep and hilly.....			0.1				0.1	0.2
		22.5	1.4	19.7	42.5	37.9	30.5	11.2
<i>Land Class IV—</i>								
Level to undulating.....		0.2			7.2	25.2	30.4	19.6
Gently rolling.....					1.6	4.1	6.4	3.9
Rolling.....								
Steep and hilly.....								
		0.2			8.8	29.3	36.8	23.5
<i>Land Class V—</i>								
Level to undulating.....						0.2	4.0	59.5
Gently rolling.....								0.8
Rolling.....								
Steep and hilly.....								
						0.2	4.0	60.3
	100	100	100	100	100	100	100	100

¹ Soil group I fine sand, sandy loams, gravelly sandy loams of Hatton series; II fine sandy loams, and light loams of Haverhill, Hatton and Cypress series, loams distinctly gravelly; III soils of eroded areas medium to heavy textures, usually shallow; IV 'burnt-out' or 'blow-out' loam to clay loams (Echo series), soils distinctly alkali. V loams and silt loams of Weyburn, Haverhill, Fox Valley series; VII Sceptre clay, Fox Valley silty clays, Sceptre clay and Haverhill clay loam mixtures; VIII heavy clays of Regina and Sceptre series.

² Includes 57,600 acres 'dune' topography.

Clay loam to clay soils are the most common in Land Classes IV and V, 60 per cent of the area mapped as heavy clay being rated in Class V. Land with soils of a loam texture, the medium-textured soils, generally falls in Land Class III though there is approximately nine per cent of the area with this medium-textured soil rated as Land Class IV, loam of the Cypress series in the western part of the area classified largely accounts for this. Although four-fifths of the land with soils predominantly of "blow-out" loam and alkali has been rated in the lower land classes, one fifth, less affected by the "blow-out" condition, has been rated as Land Class III.



FIG. 6.—*Upper Picture*: Soil—clay loam but varying in topography and degree of stoniness, with both of which is associated the amount arable, and accounts for the four different land classes shown above. In the foreground to the right Land Class III and in the centre Class IV; to the right of the IV and extending into the background of the picture is Land Class I—rough hilly grazing land.

Lower Left Picture: Land Class V in immediate foreground with Land Class III beyond; soil varies from heavy clay to clay loam; a change in the topography across the north half of Section 21. Land all under cultivation. Note the level topography in the foreground of the picture as compared with that beyond the creek.

Lower Right Picture: Land Class II—marginal land, hilly with sloughs and potholes and stony giving considerably less than a full quarter per unit arable. Capable of producing on an average annually for sale from 350 to 475 bushels of wheat per quarter.

From Royal Canadian Air Force Photographs, taken October, 1937.

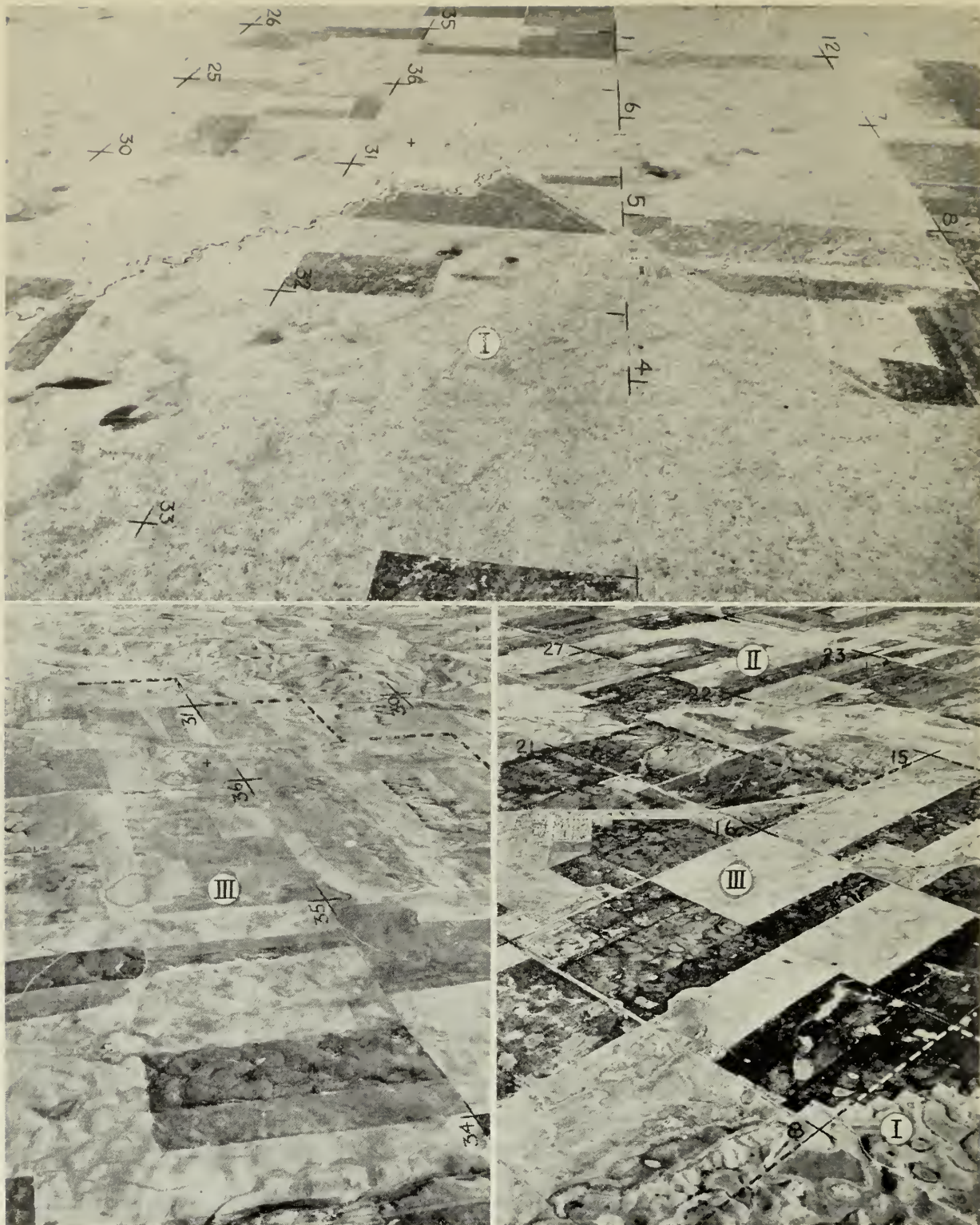


FIG. 7.—*Upper Picture:* Broad expanse of Land Class I (sub-marginal), mostly prairie with a few quarter sections broken and cultivated. This is level land but the soil is blow-out loam commonly known as “burn-outs”. Large areas of this type of land occurring in R.M. 38 and R.M. 68 have recently been fenced by the P.F.R.A. for community pasture.

Lower Left Picture: Land Class III, all under cultivation. soil generally a loam with rolling topography. Land Class I in the background is very hilly with the occasional patch of cultivated land.

Lower Right Picture: Land Class I in immediate foreground to right, strongly rolling topography. Land Class III in centre of picture varies from loam to clay loam soils with topography undulating to moderately rolling. Poorly drained depressions are common. Land Class II occurs in background—soil inferior to that in Class III and topography less favourable.

From Royal Canadian Air Force Photographs, taken October, 1937.



FIG. 8.—*Upper Picture:* Land Class V excellent wheat land in foreground, level, heavy clay all under cultivation; Land Class III—fair wheat land, surrounds the creek, same soil, but much less arable per quarter; to the left bordering excellent wheat land is Land Class II—marginal land—in secs. 18 and N $\frac{1}{2}$ 24 where the soil is much lighter than nearer the creek; and in the background bordering Land Class II, III, and V is Land Class I submarginal for wheat, sand to fine sandy loam. Practically all of this Land Class I has been broken with much of it farmed in recent years. Note the drifted sand on secs. 25, 26 and beyond.

Lower Picture: Land Class I—submarginal, sections 35, part of 36, 30, 25, and east and south of the village sand to sandy loam and alkali near village, little cultivated in recent years. The soil boundary between heavier and lighter land crosses diagonally S. E. Sec. 2. To the left, (north) of this is another view of Land Class V—slightly more rolling than that shown in the first picture but texture of soil heavy clay capable of producing annually for sale on an average over 900 bushels of wheat per quarter.

Stones.—On the loams and clay loams there are parcels which have been rated in the lower land classes even where the topography is favourable for cultivation. Generally these have been discounted in the rating on account of stones. The frequent occurrence of stones even where it is feasible to keep the cultivated land clear of them by periodic picking, adds materially to the cost of cultivating the land.

Broken or Improved Land.—The earliest attempt at commercial wheat production in the area occurred within the northeastern belt of the area classified. In the early days of settlement this was most accessible to the railway. The main line of the Canadian Pacific Railway was built into Moose Jaw in 1882 and the line connecting Moose Jaw and Weyburn twelve years later. Moreover, this land was fairly level, relatively free from stones and readily cultivatable. The best wheat soil, the Regina heavy clay and the poorest, the sands and coarse sandy loams, as well as some of the worst of the "blow-out" land occur in this northeastern belt. Where these poor soils occur, much of the land was abandoned for wheat production even prior to 1910. The superior land has remained in cultivation and competition for it has generally been keen.

As settlement pushed west and south beyond the Coteau, similar experience to that obtained farther east resulted in certain parcels being partially broken out, farmed for a time, and then left idle to revert to prairie; while other superior parcels were completely broken out and have since remained in cultivation. This difference in the land may not be due to soil alone, as with the northeastern belt, but to the nature of the topography and the presence of stones which make the land more difficult and costly to cultivate.

In table 7 are set out acreages falling within each land class and the percentages of broken land.

TABLE 7.—PERCENTAGE OF BROKEN OR IMPROVED LAND FOR THE AREA¹ AND BY LAND CLASSES, FIFTY-SIX MUNICIPAL UNITS, SOUTH CENTRAL SASKATCHEWAN, 1936-1939

Land class	Acres	Per cent broken or improved
I.....	4,532,426	19.3
II.....	2,117,885	65.4
III.....	3,304,773	86.7
IV.....	1,381,409	96.8
V.....	206,294	98.6
Total area.....	11,542,787	57.8

¹ Does not include 13,009 acres in irrigation block of Local Improvement Districts Nos. 47 and 17 (Val Marie Project), 5,760 acres in Indian Reservation Rural Municipality 44, and 10,200 acres in Dominion Animal Quarantine Reservation Local Improvement District 13.

The high percentage of broken land in higher land classes is noteworthy. The margin of cultivation has in general been determined by the quality of the soil, the nature of the topography, the degree of stoniness or a combination of these, and by the returns from cultivation of land over the period which has elapsed since settlement began.

What has occurred in the past on these lands, with the same utilization may be expected of the land at present unbroken or that of similar physical characteristics recently broken.

Parcels graded as Land Class I, submarginal for wheat, consist mainly of two general types of land: (1) none or a very limited portion is suitable for cultivation on account of a hilly and rough topography or of the too-frequent occurrence of stones. The soil in itself may be fairly heavy and productive but the topography, the stones or a combination of these two disadvantages renders the parcel too costly to farm in the type of agriculture suited to the area; (2) the soil is too light in texture, pitted with "blow-outs" or affected with alkali to such a degree as to make the parcel relatively unproductive, though from the standpoint of topography and degree of stoniness the land may be fairly attractive to farm. Though scattered throughout the classified area in larger blocks, land in this class occurs in the Missouri Coteau, in the eroded areas of the Wood Mountain Plateau and surrounding the Frenchman Creek, in the "blow-out" loams in the east, and sandy loams on the northern part in the vicinity of Mortlach, Chaplin and west of Swift Current.

Parcels graded as Land Class II in the area classified vary from 30 to 100 per cent suitable for cultivation and the soil types range from the heaviest and most productive clay to the lighter textured soils in the fine sandy loams. Quarter-sections with a soil type having a long-time expected average wheat yield of fifteen bushels per acre such as Regina heavy clay, require less arable

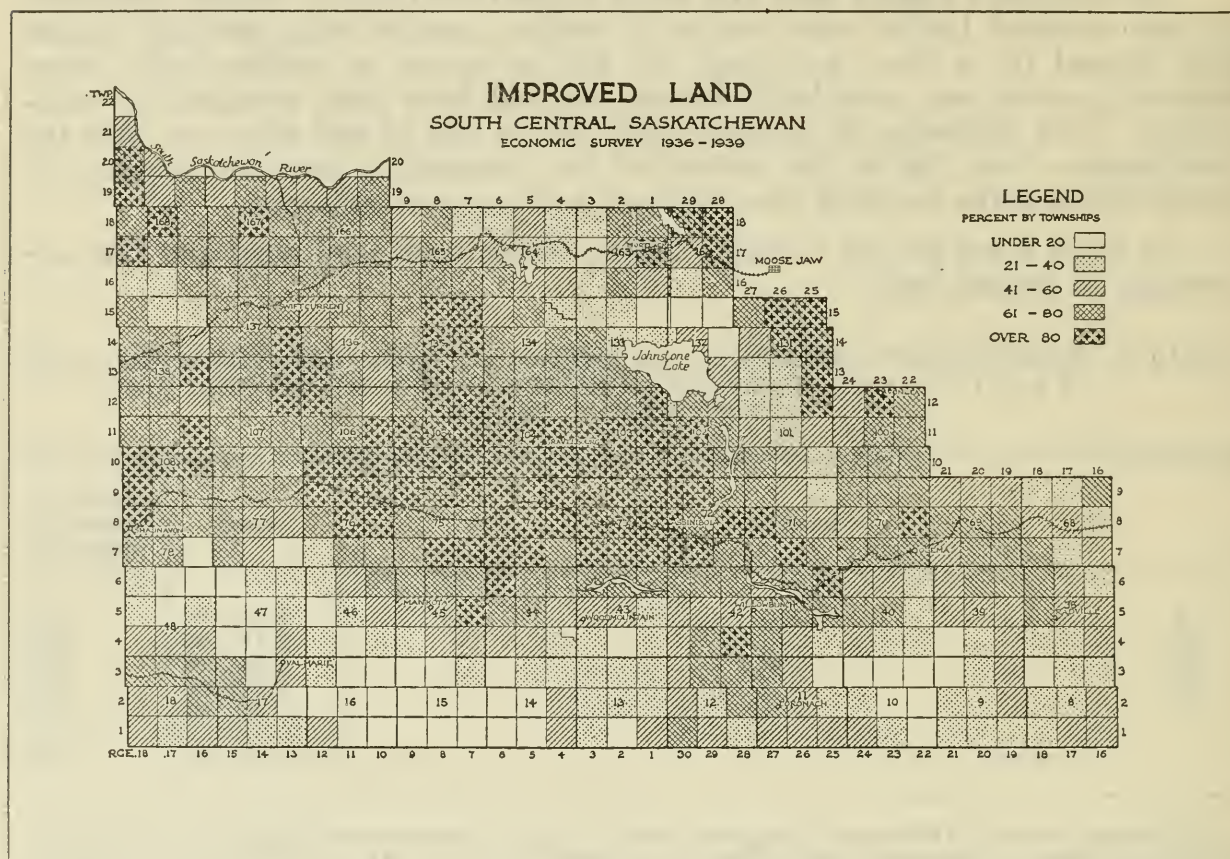


FIG. 9.—Amount of Improved Land in the Area. A high percentage of the better class of land is now under cultivation.

acreage than those having a soil type with a long-time expected yield of less than nine bushels, such as Hatton fine sandy loam, to return an equivalent income. Therefore on quarter-sections of lighter-textured soils a greater proportion of arable land is necessary in order to rate as Land Class II than on parcels of heavier-textured soils. The topography is less rolling and stones are fewer than is the case with parcels in Land Class I. Land in this class is fairly generally distributed throughout the classified area.

In general parcels rated at Land Class III contain a higher proportion of arable land than do parcels rated as Land Class II. With a less rolling topography and stones occurring less frequently, Land Class III parcels are more readily cultivated. Where parcels are alike in these respects Land Classes II and III usually differ in soil, the latter having a heavier textured soil. Typical of Land Class III, in the area classified, are parcels predominantly of a Haverhill loam soil and undulating to gently rolling topography. Land in this class is the most commonly distributed of all land classes in south central Saskatchewan.

In Land Class IV, the soil is generally heavier in texture, and the land more favourable for cultivation in respect to other physical characteristics than that rated in Land Class III. Typical of parcels rated Land Class IV are those of a clay loam to clay soil, level to undulating in topography, relatively free from stones with 90 per cent cultivatable. Isolated blocks of this land class occur east of the Coteau, and in pockets within the Coteau. A comparatively large part of the plains south and west of the Coteau has been graded as Land Class IV.

Land Class V parcels are practically 100 per cent cultivatable, generally of a heavy clay soil, level to undulating, well drained and free from stones. Land Class V makes up a much smaller proportion of the classified area than do the other land classes. A large proportion of the parcels on Regina heavy clay lying east of the Coteau, on the Sceptre heavy clay adjacent to Assiniboia and in the northwestern part of the area in the vicinity of the South Saskatchewan River has been rated Land Class V.

OCCUPIED, VACANT AND ABANDONED LAND

Approximately 90 per cent of the total acreage in the fifty-six municipal units was occupied at the time the surveys were made. By occupancy is implied land on which a resident in the vicinity or nearby is exercising an active claim for its use either for farming or grazing purposes. Five per cent of the total acreage was vacant. This is land not in use at the time the surveys were made and because no attempt to settle on this land had been made it is distinguished from abandoned land. "Abandoned" implies that the land was at one time occupied and farmed, but subsequently abandoned. Six per cent of the total acreage was abandoned.

The percentage of the occupied, vacant and abandoned land for the whole classified area and by land classes is shown in table 8.

TABLE 8.—PERCENTAGE OF OCCUPIED, VACANT AND ABANDONED LAND FOR THE TOTAL AREA AND BY LAND CLASSES, FIFTY-SIX MUNICIPAL UNITS, SOUTH CENTRAL SASKATCHEWAN, 1936-1939

	Total area	Land class				
		I	II	III	IV	V
	%	%	%	%	%	%
Occupied.....	89	78	90	97	99	100
Vacant.....	5	12	1	.....	.....	.....
Abandoned.....	6	10	9	3	1	.....
	100	100	100	100	100	100
Total acres (000 omitted).....	11,543	4,533	2,118	3,305	1,381	206

It will be observed that all the land in Land Class V was occupied, practically all in Land Class IV and 97 per cent in Land Class III. The unoccupied land in these latter two classes is listed as abandoned but it is more than probable, particularly of the small amount in Land Class IV, that the abandonment is temporary. The years in which the economic surveys were made included 1937, the most disastrous year of crop failure from drought ever experienced in Saskatchewan. There also followed a number of years in which partial and complete crop failures were experienced over the greater part of south central Saskatchewan. Reports of the migration of settlers from this part of Saskatchewan during these partial and complete crop failure years have led many to believe that more land has been abandoned than is actually the case.

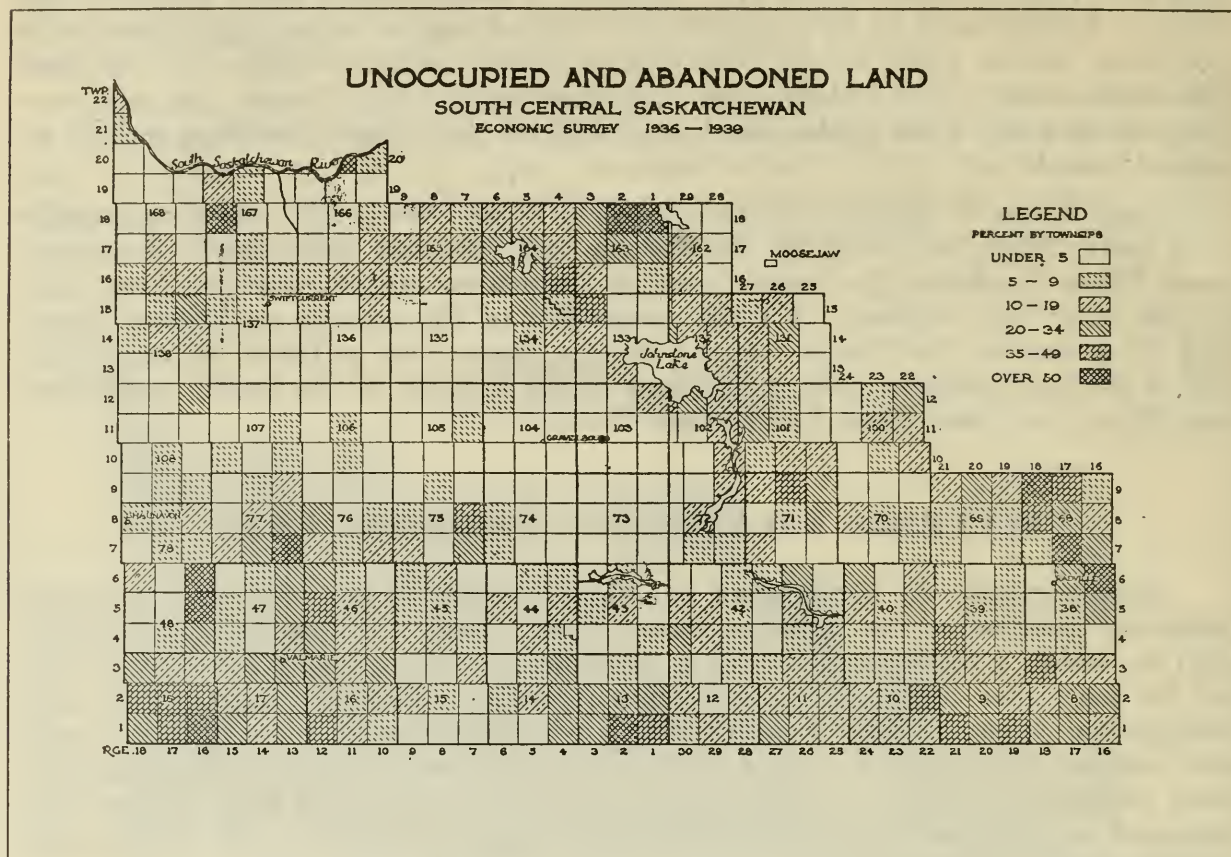


FIG. 10.—Distribution of Unoccupied and Vacant Land in the Area. Land which was found unsuitable for wheat production is gradually reverting to grass. Some of it was never occupied for wheat farming. It is better suited for grazing.

It is true that a substantial number of settlers left the area in the recent drought period, evidence of which has already been given in the discussion of population, and farms have been abandoned. But the farms they left have been usually on the poorer land; and where a farm on better land was vacated it was invariably occupied by others, either a neighbouring farmer or his son. It has been said that government assistance helped to maintain the settlers on poor land—that is no doubt true, but it is also true that government assistance was provided for moving settlers to other parts of Saskatchewan, particularly north and northeastern Saskatchewan, to west central and northern Alberta, to irrigated districts in Alberta, to British Columbia, to Manitoba and to Eastern Canada; in fact to any place in Canada where the settler felt he could improve his lot. Then, too, with the increased use of machinery more adaptable to the type of farming, the farmer in this area has been able to operate more land than formerly with the same labour and this has led to an increase in the average size of the farm with a consequent reduction in the number of farmers.

Since the economic survey of south central Saskatchewan was completed, a number of community pastures ¹² have been constructed by the Prairie Farm Rehabilitation Administration on Land Class I in this area and thus the distribution of the Land Class I, according to occupied, vacant and abandoned categories as given in table 8, will be slightly altered at the present time.

OWNERSHIP AND TENURE

Ownership.—Table 9 presents the reported ownership, based on municipal records for the whole area and for each land class. Of Land Class I (submarginal for wheat production), in the fifty-six rural municipal units, about 49 per cent was privately owned, 40 per cent being owned by people residing in the vicinity at the time the economic surveys were made. More than 43 per cent of the land in this class was publicly owned. Most of this was owned by the Crown and a survey in 1940 would probably show a slightly higher amount of publicly-owned land because of the organization of community pastures in the area.

TABLE 9.—STATEMENT OF LAND OWNERSHIP LAST RECORDED, ACCORDING TO MUNICIPAL RECORDS, BY LAND CLASSES, FIFTY-SIX MUNICIPAL UNITS, 1936-1939

	All classes	Land Class				
		I	II	III	IV	V
	%	%	%	%	%	%
Private owner living in locality.....	65.9	39.9	77.0	83.5	85.9	90.3
Private owner living elsewhere in Saskatchewan....	4.2	3.6	5.2	4.9	3.5	1.1
Private owner living outside Saskatchewan.....	5.5	5.2	6.8	4.8	5.7	5.5
Total privately owned.....	75.6	48.7	89.0	93.2	95.1	97.1
Rural municipality.....	1.2	2.6	0.6	0.1	0.1	0.0
Crown land.....	16.7	41.0	3.0	1.0	0.3	0.0
Hudson's Bay Company.....	1.3	2.6	0.9	0.3	0.1	0.0
Railway companies.....	0.2	0.4	0.1	0.1	0.1	0.0
Mortgage, insurance and trust companies.....	4.2	3.6	5.3	4.7	3.8	1.9
Other.....	0.8	1.1	1.1	0.6	0.5	1.0
	100.0	100.0	100.0	100.0	100.0	100.0

It will be observed that the percentages of private ownership of the land in the other land classes are considerably higher, and little Crown land falls in these land classes. The 75.6 per cent of all land classes reported as privately owned is, of course, nominal ownership; what equity the private interests have in the land, or in what stage of transition to public ownership the land may be, will require further study.

Tenure.—Of the acreage reported as occupied in the foregoing statement in Land Class I, 40 per cent was held under grazing lease; practically none in land classes higher than Land Class II was held under grazing lease.

The percentages of occupied acreage being operated by owners, renters and lessees at the time of the survey for the whole area and by land classes are set out in table 10.

It is interesting to note that of the occupied land, the proportion of land which is owner-operated tends to increase with the higher land classes; whereas the proportion of land which is rented tends to decrease with the higher land classes. In long-settled regions, it is generally found that a relatively smaller proportion of the better land is owner-operated, and a greater proportion

¹² There were approximately 272,000 acres enclosed and operated in the area as community pastures by the end of 1939.

tenant-operated than of the poorer land. Over a long period of time competition for the better land results in higher rents being paid which in turn raises the value of such land to a price that many prospective farmers cannot afford to pay, and they are forced to rent if they choose to farm the better land. Many farmers about to retire also prefer to retain the ownership of a farm of good land, for the rent will usually return a fair rate of interest on the investment, and it is possibly the only form of investment with which they are familiar and they feel they can continue to exercise some control over its earning power. Moreover, most farmers in seeking land have very limited funds and are attracted to the poorer lands which can be procured for less money. Once having purchased such land, it is not readily disposed of, and having invested their savings they continue to farm the land which they own, and although they have less opportunity of improving their position financially, they are usually assured of a home. It is evident that economic forces have not operated for a sufficiently long time to bring about this situation in the area classified in south central Saskatchewan. It may be also true that the migration which has taken place in recent years from this area has resulted in more of the poorer land being available for rent and nearby farmers have preferred to rent rather than purchase.

TABLE 10.—PROPORTION OF OCCUPIED ACREAGE OWNER OPERATED, RENTED AND LEASED FOR THE WHOLE AREA AND BY LAND CLASSES, FIFTY-SIX MUNICIPAL UNITS, SOUTH CENTRAL SASKATCHEWAN, 1936-1939

	Percentage of acreage					
	All classes	Land Class				
		I	II	III	IV	V
Owner operated.....	56	34	64	68	69	72
Rented.....	27	21	32	30	29	24
Leased.....	14	40	2	.....	.....	.....
Other ¹	3	5	2	2	2	4
	100	100	100	100	100	100
Total acres (000 omitted).....	10,249	3,554	1,906	3,208	1,375	206

¹ "Other" includes townsite property farmed and land farmed by persons living outside of area of survey for which information is incomplete.

OCCUPIED FARMS

In the fifty-six municipal units, 15,893 occupied farms were recorded. The term "occupied farm" as used in this report means land operated, whether owned, rented or leased, by a resident, and includes ranches and combination "grain-ranch" units. Where two farms were operated by the same person the farms were considered as one farm unit, for example, a son operating his own farm, and his father's farm in addition. Occupied farms include a few parcels outside the surveyed area operated by a farmer resident in the area; conversely parcels within the area operated by farmers living outside are excluded.

A little more than 13 per cent of the occupied farms included some leased grazing land varying in amount from one-quarter section to several sections. Approximately one-half of these contained only one-quarter of leased land, and four-fifths had not more than a section. Less than two per cent of the farms with leased grazing land contained ten sections or more of this land. With this much grazing lease a farm becomes a small ranch. These small ranches amount to less than one-fourth of one per cent of the total number of occupied farms in the whole area; of these, nine had more than twenty sections of grazing lease.

Distribution of Occupied Farms by Land Classes.—Although there are a number of parcels held under grazing lease which have been rated Land Class II and the odd parcel has been rated in a higher land class, by far the greater proportion fall in Land Class I (see table 10). Since the classification has been made on a basis of wheat production, parcels held under grazing lease have not been considered as part of the farm unit for a description of the land class or classes on which the farm is located in the tabulation which follows (table 11). Thus, a farm with four quarters of Land Class V, owned or rented, and three quarters of Land Class I leased for grazing is described as being wholly on Land Class V.

Of the total number of occupied farms, approximately 43 per cent have the greater part of the farm unit in Land Class III; a little less than one-half of these are wholly in this class. Approximately 21 per cent of the occupied farms are either wholly or predominantly in Land Classes IV and V; and about the same percentage of all the farms are either wholly or predominantly in Land Class II.

TABLE 11.—NUMBERS AND PERCENTAGES OF ALL OCCUPIED FARMS IN EACH LAND CLASS OR CLASSES, 1936-1939

	Number	Percentage
Land wholly in Land Class I.....	1,463	9.2
Predominantly in Class I with part in Land Class II.....	498	3.1
Predominantly in Class I with part in Land Class III or higher.....	430	2.7
Land wholly in Land Class II.....	1,412	8.9
Predominantly in Class II with part in Land Class I.....	1,171	7.3
Predominantly in Class II with part in Land Class III or higher.....	741	4.7
Land wholly in Land Class III.....	3,111	19.6
Predominantly in Class III with part in Land Class I and/or Land Class II....	3,141	19.8
Predominantly in Class III with part in Land Class IV and/or Land Class V...	538	3.4
Land wholly in Land Class IV.....	1,485	9.3
Predominantly in Class IV with part in Land Class I and/or Land Class II....	356	2.2
Predominantly in Class IV with part in Land Class III and/or Land Class V...	1,121	7.1
Land wholly in Land Class V.....	188	1.2
Predominantly in Class V with part in other land classes.....	227	1.4
Class undetermined ¹	11	0.1
All land classes.....	15,893	100.0

¹ Farms with quarters outside the surveyed area whose land class has not been determined.

Nine per cent of all occupied farms in the area are wholly in Land Class I. Six per cent are made up of parcels which are mostly rated in Land Class I.

In using the quarter-section as the unit in the economic land classification, it will be noted from the foregoing that the land-class boundary may cut across a farm. This is not entirely satisfactory since in reality the farm is the "economic unit." Farms, however, vary in size as well as in the composition of different grades of land and to express the relative potential productive differences some common measure must be chosen. From a physical standpoint the smallest unit, namely an acre, would possibly be a more suitable common measure to use in expressing the relative potential productive value of one unit as compared with another. Soil boundaries and changes in other physical characteristics do not coincide with the boundaries of a quarter-section, much less the boundaries of a farm, and changes may even occur within a unit as small as an acre. But, in an economic classification one is concerned with potential productive differences of one farm as compared with another. An attempt to use the farm as a unit in establishing an economic classification involves practical difficulties in this area.

In Western Canada the quarter-section survey fixes the unit for legal description, original free grant of land, taxation purposes and so forth, and it is rarely divided by sale for agricultural purposes. It is permanent. A farm may contain three quarter-sections this year and in five years hence two quarters from an adjoining farm may be included, and one of its original quarters may even be sold to form a part of another farm. The farm boundaries are by no means permanent. Because of this, the quarter-section has been used as the unit in the economic classification of the land in south central Saskatchewan, and as explained earlier in this report, its rating has been premised on the fact that it forms part of a farm of average size with the typical farm practices, management and organization of the area.

The Farm Unit in the Interpretation of the Land Classification.—

Although there is a definite association between any one land class and the farms in the land class, the land class does not necessarily determine whether or not any particular farm can be operated at a profit over a period of years. The size of the farm is one factor that must be taken into account. It will be recalled that land was defined as marginal for wheat production where a farm of three quarter-sections (the average for the area excluding ranches and semi-ranches) in size was capable of producing for sale on the average the equivalent of approximately 350 to 475 bushels of wheat annually per quarter or 1,050 to 1,425 bushels per farm.

While an increase in size of farm may be expected to decrease costs of production per bushel, there will of necessity be an increase in total operating costs for a larger sized unit; and conversely a smaller farm may be expected to have increased costs of production per bushel but with a decrease in the total operating costs. The study at present has not been pursued far enough to determine what the added costs of operating a larger unit or the decreased cost of operating a unit smaller than three quarter-sections would be. It is of interest, however, to examine the farms located on each land class on the basis of their potential "production of wheat for sale." In the discussion which follows additional costs in operating larger units and reduced costs in operating farms less than three quarter-sections in size are ignored, and 1,425 and 1,050 bushels are assumed as the dividing line between farms which can and cannot be operated at a profit.

In table 12 an analysis is made of farms wholly on a single land class on the basis of bushels of wheat for sale. Farms with pasture leases have been excluded in order to confine the analysis, as far as possible, to farms on which at least 80 per cent of the farm income is derived from wheat. The farms used in the tabulation are therefore somewhat smaller than the average for the whole area. A relatively greater proportion of the farms of the smaller sizes are located on a single land class than is the case with the farms of the larger sizes.

TABLE 12.—DISTRIBUTION OF FARMS WHOLLY IN A SINGLE LAND CLASS BY LAND CLASSES, ACCORDING TO THE PRODUCTION OF WHEAT FOR SALE, FIFTY-SIX MUNICIPAL UNITS, SOUTH CENTRAL SASKATCHEWAN, 1936-1939

Range (Production of wheat for sale)	Percentage of farms on a single land class				
	I	II	III	IV	V
	%	%	%	%	%
Less than 1,050 bushels.....	85.7	67.4	19.7	14.0	8.2
1,051 to 1,425 bushels.....	8.8	16.4	31.6	4.8	2.2
More than 1,425 bushels.....	5.5	16.2	48.7	81.2	89.6
	100.0	100.0	100.0	100.0	100.0
Number of farms.....	1,001	1,240	2,961	1,421	183

Of the farms wholly of land classified as submarginal for wheat production, Land Class I around 86 per cent might be considered uneconomic units, about nine per cent on the borderline, and five per cent in the category of profitable farms.

Of the farms wholly on land classified as marginal for wheat, Land Class II, about 67 per cent of those actually operated may expect less than 1,050 bushels of wheat available for sale on an average annually, and thus are uneconomic units as wheat farms. About 20 per cent of the farms wholly in Land Class III, 14 per cent of those wholly in Land Class IV and about eight per cent of the farms on Land Class V are similarly uneconomic units for wheat production.

The proportion of farm units above the borderline of profitable wheat production wholly in the four land classes, Land Class II or better, are: in Land Class II 16.2 per cent, in Land Class III 48.7 per cent, in Land Class IV 81.2 per cent, and in Land Class V 89.6 per cent.

The same farms are further analysed in table 13 as to size and percentage of the land improved. The farms which are wholly of land classified as submarginal for wheat (Land Class I) but on the basis of the farm unit are assumed to be on the borderline of profitable wheat production or better are not only larger farms than the average for the whole area but have a fairly high percentage of land broken out. Farms which are wholly on Land Class II but which are below the level of profitable wheat production are considerably smaller (one-half section and less) than the average size unit. Farms which are on Land Classes III, IV and V, but in their productive showing are uneconomic for wheat production are much smaller (less than half a section) than the average size of farm.

From the foregoing it will be recognized that areas that are submarginal for wheat production (Land Class I) may contain some farms that are economic for wheat production and furthermore areas composed of land in the higher classes may contain some farms that are uneconomic. Profitableness of wheat farming is dependent on the size of the unit as well as the quality of the land; and this size for marginality of farms obviously decreases in areas included in Land Classes III, IV or V. It must be borne in mind, however, that the larger unit may not have a sufficiently lower cost of production to make such a unit better than a borderline farm. Such units are likely to occur in Land Class I and Land Class II where, on account of the nature of physical features of the land, in order to obtain sufficient cultivatable land the unit must contain scattered patches of cultivated land which are more costly to farm than a contiguous area.

TABLE 13.—RELATION OF PRODUCTION OF WHEAT AVAILABLE FOR SALE AND SIZE OF FARM WITH PERCENTAGE IMPROVED FOR FARMS ON A SINGLE LAND CLASS, FIFTY-SIX MUNICIPAL UNITS, SOUTH CENTRAL SASKATCHEWAN, 1936-1939

Range production of wheat for sale	Land class									
	I		II		III		IV		V	
	Acres per farm	Per cent improved	Acres per farm	Per cent improved	Acres per farm	Per cent improved	Acres per farm	Per cent improved	Acres per farm	Per cent improved
(bushels)										
Less than 1,050...	294	40.7	250	62.8	191	78.1	160	95.1	160	96.9
1,051-1,425.....	562	58.2	372	71.7	324	83.5	300	88.1	224	86.8
More than 1,425..	844	68.6	571	77.7	524	88.6	474	97.1	503	98.4
All farms.....	348	46.9	322	68.8	395	86.3	422	96.7	469	98.2
Number of farms	1,001	.....	1,240	.....	2,961	.....	1,421	.....	183	.....

FARM BUILDINGS AND LAND CLASSES

All sets of farm buildings were given a rating during the survey. Five general grades were made, the basis being the size—indicating to some extent the investment, the state of repair, and general appearance. The five descriptive grades are set out in table 14, which also gives the distribution of the occupied sets of farm buildings according to this grading by land classes.

Of the 2,076 occupied sets of buildings of farms predominantly in Land Class I, approximately 60 per cent were graded as small and generally in a poor state of repair; of the 398 occupied sets of buildings of farms predominantly on Land Class V only seven per cent of them were similarly graded.

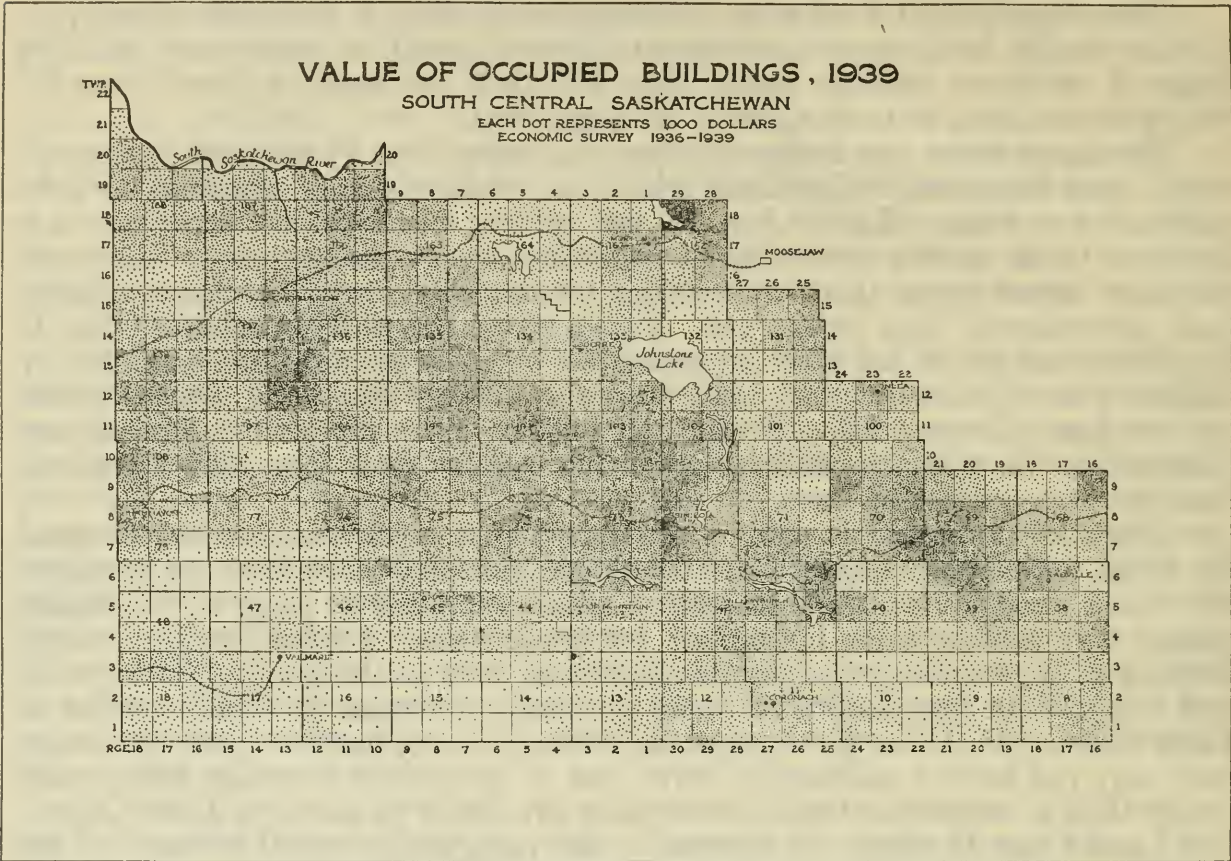


FIG. 11.—Better buildings are associated with better land. Over a long period they tend to reflect the productiveness of the land on which they are located.

Approximately 56 per cent of the sets of buildings on farms in Land Class V were of a medium to large size and in good state of repair, whereas nine per cent or less were similarly described for farms in Land Classes I and II.

TABLE 14.—DISTRIBUTION OF OCCUPIED FARM BUILDINGS ACCORDING TO RATING ON SIZE AND CONDITION BY LAND CLASSES—FIFTY-SIX MUNICIPAL UNITS, SOUTH CENTRAL SASKATCHEWAN 1936-1939

Rating of farm buildings	Percentage of farm buildings in each land class				
	Land Class				
	I	II	III	IV	V
Small, poor state of repair.....	57.9	49.9	28.3	17.2	7.0
Small to medium in fair state of repair.....	34.7	41.1	52.0	52.3	37.4
Medium size, good state of repair.....	6.9	8.6	18.3	27.3	43.0
Large buildings, in good repair.....	0.5	0.4	1.3	3.1	12.1
Large buildings, in excellent condition.....			0.1	0.1	0.5
	100.0	100.0	100.0	100.0	100.0
Number of sets of farm buildings.....	2,076	3,100	6,442	2,753	398

In general the investment is greater and the condition of the buildings better in the higher land classes. The contrast is quite marked, but there are exceptions. The first buildings erected were usually of frame construction from material hauled from the nearest railway—in early days frequently many miles away. Occasionally a sod shack served for a time; frequently straw sheds were the only barn accommodation. Some farmers have not been able to improve the buildings beyond the stage of their early pioneering days but many have replaced these buildings with more permanent and attractive structures.

In farm business studies carried on during 1939 in connection with the Economic Land Classification project and a study of farm tenure, in municipalities¹³ of the province other than those reported herein, estimated values were placed on farm buildings as well as the rating described in the foregoing. By computing the 1939 estimated average value for the different farm building ratings, it has been possible to give an estimated value of occupied farm buildings in the area classified. This is shown by townships in a dot map on page 32.

ASSESSED LAND VALUES

Relation of Assessed Land Values to Land Classes.—Eliminating land leased for grazing purposes which carries only a nominal assessment, and land with no assessment, an analysis has been made of the present assessments (previous to 1939). This has been confined to the forty-eight organized municipalities in the classified area.

The average assessment for all municipalities with the lowest and highest average assessments for any one of the municipalities, by land classes, is presented in table 15. While the assessment values indicate a relative grading of the land, there is a wide range in the average assessment values for the same land class as between municipalities. Thus, in Land Class I the average assessed value of \$15.15 per acre in one is nearly three times greater than the assessed value of \$5.16 in another. In Land Class IV the average assessed value for one municipality is approximately twice as much as another. Average assessments for the other land classes show similar variations as between municipalities.

TABLE 15.—AVERAGE ASSESSMENTS PER ACRE AND RANGE IN AVERAGE ASSESSMENTS AS BETWEEN MUNICIPALITIES, BY LAND CLASSES FOR FORTY-EIGHT MUNICIPALITIES IN SOUTH CENTRAL SASKATCHEWAN, ECONOMIC SURVEYS 1936-1939¹

Land Class	Average assessments all municipalities	Range in average assessments as between municipalities	
		Lowest	Highest
	\$	\$	\$
I.....	9.65	5.16	15.15
II.....	13.47	8.38	18.50
III.....	17.64	11.85	22.33
IV.....	21.82	13.54	26.94
V.....	28.16	18.82	33.82

¹ Parcels leased for grazing purposes which carry only a nominal assessment (usually \$2.00 per acre) are not included.

Not only are there extreme variations in the assessed values for the same land classes as between municipalities but also there are extreme variations in the relative spread in the assessed values from one land class to another as

¹³ Farm Business studies by the Economics Division, Dominion Department of Agriculture and the Department of Farm Management, University of Saskatchewan in 1939, were made in Rural Municipalities 169, 211, 213 and parts of 440, 470, 471 and 472.

between municipalities. Thus it will be noted in table 16 the municipality having the lowest average assessment of Land Class I, ranges from an average of \$5.16 per acre for Land Class I to \$16.31 per acre for Land Class IV; the municipality having the highest average assessment for Land Class I ranges from an average of \$15.15 for Land Class I to \$20.77 per acre for Land Class IV. The spread in the assessments of the latter municipality is only about one-half of the spread in the former. Similarly the spread in the average assessment valuations carrying the lowest average assessment for Land Class V ranges from an average of \$11.54 for Land Class I to \$18.82 for Land Class V, a difference of \$7.28 while the municipality carrying the highest average assessment for Land Class V ranges from an average of \$8.84 for Land Class I to \$33.82 for Land Class V, a difference of \$25, amounting to more than three times the difference between the assessed values of the same land classes in the municipality having the lowest average assessment for Land Class V. The need for a reassessment of the same classes of land on a more uniform basis as between municipalities is apparent.

TABLE 16.—AVERAGE ASSESSMENTS PER ACRE BY LAND CLASSES FOR MUNICIPALITIES HAVING THE LOWEST AND HIGHEST AVERAGE ASSESSMENTS IN ONE LAND CLASS, SOUTH CENTRAL SASKATCHEWAN, ECONOMIC SURVEYS 1936-1939¹

	Land class				
	I	II	III	IV	V
	\$	\$	\$	\$	\$
Average assessments for municipality having:					
Lowest average assessment in Land Class I.....	5.16	8.89	12.63	16.31	.....
Highest average assessment in Land Class I.....	15.15	16.44	19.86	20.77	.....
Lowest average assessment in Land Class II....	5.39	8.38	15.23	19.88	.....
Highest average assessment in Land Class II....	14.39	18.50	21.09	23.53	24.88
Lowest average assessment in Land Class III....	7.57	10.36	11.85	.....	.....
Highest average assessment in Land Class III....	9.59	16.14	22.33	26.94	33.30
Lowest average assessment in Land Class IV....	9.54	9.69	15.91	13.54	.....
Highest average assessment in Land Class IV....	9.59	16.14	22.33	26.94	33.30
Lowest average assessment in Land Class V.....	11.54	14.64	17.70	18.89	18.82
Highest average assessment in Land Class V.....	8.84	14.65	19.06	25.50	33.82

¹Parcels leased for grazing purposes which carry only a nominal assessment (usually \$2.00 per acre) are not included.

The average assessment valuations given in table 16 were the basis of taxation in these municipalities up to and including 1939 and are still the basis in all the municipalities considered with the exception of nineteen where a re-assessment on a new basis took effect in 1940. These valuations are not so much the result of failure on the part of assessors in satisfactorily arriving at a fair value of the different grades of land at the time the assessments were made, but in the time lag in the re-assessment of one municipality compared with another and the changes in land values which took place in the interval. There is, of course, lack of uniformity in the gradation of land valuations. Some of the municipalities from which figures were quoted in the foregoing have not had a re-assessment since 1923, while others have had a re-assessment as late as 1936.

The greater proportion of the taxes levied by the municipalities is for school and municipal purposes, and for these the mill rate varies according to the needs of the municipality; so that taxes for local purposes paid by individuals on the same land class, as between municipalities, may be more equitable than the assessments would indicate. Moreover, the services rendered by the different municipalities to their ratepayers would need to be taken into consideration. There is, however, levied by the province through the municipalities a provincial revenue tax amounting to two mills on the assessed

valuation, and consequently municipalities with higher assessments pay a proportionately higher provincial revenue tax. The result is, that for municipalities with considerable land in the lower land classes with relatively high assessments, the uniform provincial revenue tax takes a considerably higher proportion of the income which can be expected from such land than in municipalities with considerable land in the higher land classes and a relatively low assessment. This is one of the chief reasons for the province embarking in 1939 on a program of reassessing the land in the province on a more equitable basis.¹⁴

Basis of Assessment Prior to 1939.—The basis of assessment used previous to 1939 is provided for in the Saskatchewan Rural Municipality Act 1917, which states:—

“225 (1) Land shall be assessed at its fair actual value, exclusive of any increase in such value caused by the erection of buildings thereon or by any other expenditures of labour or capital. In case the value at which any specified land has been assessed appears to be more or less than its true value, the amount of the assessment shall nevertheless not be varied on appeal, if the value at which it is assessed bears a fair and just proportion to the value at which lands in the immediate vicinity of the land in question are assessed.”

From a comparison of the prices paid for land in the various land classes by periods and the assessment values placed on these lands during those periods (tables 17 and 18), it will be noted that this “fair actual value” has been largely determined by the prices at which land was changing hands at the time of or immediately preceding the reassessment. From 1920 the values at which land was assessed for all land classes except Land Class I increased and decreased in a fairly definite ratio to the rise and decline of prices at which the land changed ownership. The difference between the assessed values and the prices paid for the same class of land as revealed in the tables is due in a large measure to the buildings being excluded for assessment purposes but they are included in the prices at which the land was purchased. In Land Class I there appears to have been a tendency in the reassessments not to lower the values to the full extent of the change in the average price at which land in this class changed ownership.

TABLE 17.—AVERAGE PRICES PAID FOR LAND PER ACRE BY LAND CLASSES IN FIVE-YEAR PERIODS 1910 TO 1934, SOUTH CENTRAL SASKATCHEWAN¹

Period of transfer	Land Class			
	I	II	III	IV & V ²
		(dollars per acre ³)		
1910-1914.....	12.92	14.53	18.03	25.48
1915-1919.....	14.40	14.25	20.27	31.68
1920-1924.....	11.09	15.04	20.66	28.22
1925-1929.....	8.75	16.67	23.12	29.73
1930-1934.....	2.34	10.31	18.92	21.01

¹ From a study of 573 transfers of ownership involving approximately 127,000 acres of land in seven rural municipalities of south central Saskatchewan.

² Includes 174 transfers in Class IV land and 8 transfers of Class V land.

³ Prices paid for land include buildings thereon.

The New Basis of Assessment.—As already noted, beginning in 1939 reassessment of rural lands in the province has been placed on a different basis.¹⁵ The assessments are no longer based directly on “fair value”

¹⁴ Freeman, T. H., Saskatchewan Method of Land Assessment, Proceedings of the Twelfth Annual meeting of the Canadian Agricultural Economics Society, 1940.

¹⁵ The reassessment on the new basis was begun in the spring of 1939 in the eastern part of the area for which an economic land classification was available.

determined in the main by prices at which land has been selling with certain adjustments, but rather on an "earnings value".¹⁶ The latter has been arrived at by setting a maximum assessed value of \$32 per acre for Regina heavy clay in an area south of Regina. This value per acre is a little less than the capitalized long-time net earnings of a section farm on this soil type in that district, with usual cropping practices and typical management. All other land types (combinations of soil, topography stoniness and other physical characteristics) are valued for assessment purposes according to their estimated productive capacity in relation to Regina heavy clay in the area selected for the maximum assessment. Certain adjustments in the base values are made for the location of the land in respect to freight, fuel and farm machinery zonal rates, and distance from local shipping points. There is a difference also in the manner in which assessing is being done. It is now carried out under the direct supervision of the province by a staff especially trained for the work; and the actual field work in assessing the land is supervised in order to maintain a uniform standard and provide for a more equitable assessment.

TABLE 18.—AVERAGE ASSESSED VALUES PER ACRE BY LAND CLASSES ACCORDING TO YEARS OF ASSESSMENT, SOUTH CENTRAL SASKATCHEWAN¹

Year assessed	Land Class			
	I	II	III	IV & V ²
		(dollars per acre ³)		
1923-1924.....	8.95	12.81	18.31	21.98
1927, 1928, 1929.....	11.29	14.50	18.29	22.18
1930, 1936.....	6.48	9.46	14.98	18.96

¹ Ten municipalities of south central Saskatchewan adjacent or near to the seven included in study of transfers table 16.

² A relatively small proportion of Class V land in these municipalities.

³ Buildings are not included with land for assessment purposes.

TAX INDEBTEDNESS IN RELATION TO LAND CLASSES

In the organized municipalities the taxes are determined by the assessed valuation and the mill-rate levy. Although the mill rate for any one municipality or any one of the school districts within a municipality may vary from year to year, for any one year the mill-rate levy between land classes does not necessarily vary. The mill-rate levy would be the same for all land classes over a large area comprising several municipalities. Therefore the past tax levies on land in any one land class compared with those in another bear the same relation as the assessed value of this land class compared with the other.

To show the relative indebtedness as between land classes on the past tax levies as of January 1, 1937, both before and after the tax indebtedness adjustment¹⁷ the tax indebtedness is given as a percentage of the assessed value in table 18.

In the forty-one organized municipalities with leased pasture land excluded, the tax indebtedness before the adjustment of January 1, 1937, for the parcels

¹⁶ Freeman, T. H., op. cit., page 69.

¹⁷ Under the Voluntary Adjustment of Debts Municipal Unit Plan tax arrears as at January 1, 1937, were reduced to the average of the last two years unpaid. In cases where there were not a full two years arrears, certain credits deductible from future taxes were given.

The whole southern part of the province, comprising one hundred and fifty-six organized rural municipalities and local improvement districts, was affected by this plan.

in Land Class I amounted to 11.2 per cent of the assessed value, for the parcels in Land Class V 3.4 per cent, and for the other land classes the percentages ranged between these two.

The proportion of the amount written off under the Voluntary Adjustment of Debts, January 1, 1937, may be readily observed by comparing the percentage figures after tax debt adjustment with those before. It affected all classes of land, but in proportion of past tax levies the extent of the write off was much greater for the parcels in Land Classes I and II.

TABLE 19.—PERCENTAGE TAX INDEBTEDNESS BEFORE AND AFTER ADJUSTMENT JANUARY 1, 1937 OF ASSESSED VALUE, BY LAND CLASSES, FORTY-ONE MUNICIPALITIES, SOUTH CENTRAL SASKATCHEWAN¹

Land Class	Number of parcels	Tax Indebtedness as a percentage of assessed value	
		Before tax debt adjustment Jan. 1, 1937	After tax debt adjustment ² Jan. 1, 1937
Class I.....	12,142	11.2	2.1
Class II.....	9,424	10.2	2.2
Class III.....	16,175	8.3	1.9
Class IV.....	7,938	6.3	1.4
Class V.....	1,227	3.4	0.5
All classes.....	46,906	8.4	1.8

¹ Includes only organized municipalities covered in surveys 1937-1939. All parcels belonging to the Crown or the Municipalities, which were assessed at a nominal sum (e.g. \$2.00 per acre) for pasture lease taxation purposes or lands without assessment have been eliminated from this calculation. Data in this form not assembled for seven rural municipalities covered in 1936 survey.

² Credits deductible in future years are taken into account in this calculation.

RELATION OF LAND CLASS TO SUCCESS OF MORTGAGE LOANS

In a study¹⁸ of the factors affecting the success of farm mortgage loans in Western Canada made by the Economics Division at the time the land classification described in this report was in progress, an adequate number of farm mortgage accounts in the area in south central Saskatchewan that was then classified were used to study the relationship of the "land class" factor to the success of the mortgage loan. The principal measure used to indicate the relative success or failure of loans was the percentage of the loans which had been foreclosed. The relative status of current loans was measured by the percentage in good standing, and the amount owing on current loans was expressed as a percentage of the original amount loaned.

The relation of Land Class to mortgage foreclosures and other factors in south central Saskatchewan as of 1929 and 1935 is shown in tables 20 and 21.

¹⁸ A Statistical Analysis of Long-term Mortgage Financing in Saskatchewan by S. C. Hudson, Economics Division, Dominion Department of Agriculture.

TABLE 20.—RELATION OF LAND CLASS TO MORTGAGE FORECLOSURES AND OTHER FACTORS RELATING TO FARM MORTGAGES IN SOUTH CENTRAL SASKATCHEWAN 1929¹

Land Class	Number of accounts	Acres mortgaged per farm	Appraised value per acre	Percentage in good standing	Debt 1929 in percentage of original loan	Percentage fore-closed
			\$			
I.....	86	284.5	15.75	7.0	105.1	19.7
II.....	172	281.0	18.03	12.2	99.3	5.8
III.....	207	316.8	22.71	15.0	97.5	2.9
IV.....	84	342.9	29.65	16.7	96.6	3.6
V.....	5	448.0	38.75	40.0	91.8	0.0
Total and averages....	554	306.7	21.95	13.4	98.2	6.5

¹ From A Statistical Analysis of Long-Term Mortgage Financing in Saskatchewan, S. C. Hudson, Economics Division, Dominion Department of Agriculture.

As has been noted, accompanying the depressed economic conditions in southern Saskatchewan drought set in with the crop year of 1929 and continued for several years in succession. As a result of this, income on all farms was drastically lowered. However, even by 1929, of the 86 farm mortgage loans which had been placed on farms in Land Class I, about 20 per cent had been foreclosed. Of the mortgages placed on farms in the higher land classes, a significantly small percentage had been foreclosed. In 1929, when compared with loans on farms in the lower land classes, a considerably larger proportion of loans in the higher land classes were in good standing. In 1935, as would be expected, only a small proportion of the loans were in good standing, and the proportion of loans which had been foreclosed was greater than in 1929. The increase in the proportions foreclosed was much more marked for the mortgage loans placed on farms in the lower classes.

TABLE 21.—RELATION OF LAND CLASS TO MORTGAGE FORECLOSURES AND OTHER FACTORS PERTAINING TO FARM MORTGAGES IN SOUTH CENTRAL SASKATCHEWAN¹

Land Class	Number of accounts	Acres mortgaged per farm	Appraised value per acre	Percentage in good standing	Debt 1929 in percentage of original loan	Percentage fore-closed
			\$	%	%	%
I.....	84	334.2	16.03	0.0	131.9	21.4
II.....	212	293.9	18.19	0.9	132.2	12.3
III.....	351	325.8	23.63	1.1	129.7	9.1
IV.....	161	347.1	28.77	1.9	128.0	3.7
V.....	12	358.3	36.60	0.0	111.8	0.0
Total and averages.....	820	323.5	23.08	1.1	129.3	10.0

¹ From A Statistical Analysis of Long-Term Mortgage Financing in Saskatchewan, S. C. Hudson, Economics Division, Dominion Department of Agriculture.

APPENDIX A

Operating Statement and Budgets for Three-quarter-section Farms

An operating statement for a farm of average size on Land Class II in south central Saskatchewan is given below. This statement shows the income derived from grain sales for farms on land at the lower limit of Land Class II compared with receipts from grain on land at the upper limit of Land Class II. Receipts from live stock and live stock products are shown to be equal for farms on land at the lower as well as the upper limit of Land Class II. The farm receipts and expenses are based on the 1922-1929 level of farm product prices and costs of operation. This statement and the budgets, which follow, were prepared from data assembled in farm management surveys made in various parts of Saskatchewan since 1925; particularly the data secured in the study of the Brokenshell-Wellington district in 1932. Their purpose was to determine the typical farm setup and the relation between farm expenses and receipts. These budgets have been modified according to the arable acreage and the 1921-1936 average yield of wheat on the predominating soil type in the quarter-section and serve as a guide in the first approach to the classification of the land.

UTILIZATION OF LAND, LIVE STOCK NUMBERS AND RECEIPTS FROM ALL SOURCES
FOR FARMS ON LAND AT THE LOWER LIMIT AND UPPER LIMIT OF LAND CLASS II

Utilization of land	acres	Total yield		Total sales		Receipts	
		Lower limit	Upper limit	Lower limit	Upper limit	Lower limit	Upper limit
		bu.	bu.	bu.	bu.	\$	\$
Wheat.....	158	1,290	1,665	1,050	1,425	1,102	1,496
Oats for grain	30	420	570	.....	150	.....	60
Oats for fodder.....	6	6 tons					
Barley }.....	17	209	275	50	110	25	55
Rye }							
		Live stock numbers		Sales of live stock and live stock products			
Other (feed and pasture).....	4	Horses.....	10				
Fallow.....	116	Cows.....	4	Cream.....		57	57
Cropland.....	331	Other cattle	7	Cattle.....		70	70
Pasture and waste.....	149	Sows.....	1	Hogs.....		62	62
		Other hogs..	7	Poultry.....		12	12
		Hens.....	60	Eggs.....		25	25
Total.....	480	.....	.....	.....	.....	1,353	1,837

It will be noted that the budgets provide for no surplus from the gross revenue, above that required for the continued operation of the farm and a living allowance for the farm family. There is no net income to pay for the use of the land or to service land indebtedness if so required. The land is fully utilized in crop production or in raising live stock and live stock products for farm use and for sale. Eighty per cent or more of the gross revenue is derived from the sale of wheat. About 70 per cent of the farm is cultivatable. The average yield of wheat is approximately eight bushels per acre for a farm on land at the lower limit of Land Class II and about 11 bushels per acre for a farm on land at the upper limit of Land Class II.

**FARM EXPENSES, ALLOWANCE FOR CAPITAL REPLACEMENT AND CASH LIVING
EXPENSES FOR FARMERS ON LAND AT THE LOWER LIMIT AND UPPER
LIMIT OF LAND CLASS II**

Items	Lower limit	Upper limit	Items	Lower limit	Upper limit
	\$	\$		\$	\$
Paid labour and board.....	40	55	Total cash farm expenses.....	531	607
Fencing.....	20	20	Auto (depreciation, gas, oil, repairs).....		120
Equipment repairs.....	36	36	For capital replacement:		
Binder twine.....	44	51	Depreciation at 5% on buildings	100	100
Feed grinding.....	15	15	Depreciation at 7% on machin- ery.....	64	64
Threshing (less one-third for exchange labour).....	142	186			
Taxes.....	139	149	Cash living allowance for farm family (operator's earnings)....	658	946
Building repairs and paint.....	30	30			
Other farm expenses.....	65	65			
	531	607		1,353	1,837

The years 1922 to 1929 inclusive were chosen as a base period in calculating costs and returns because this was the most recent period when there has been some degree of stability in the relationship of farming costs to prices received for farm products. During this period the average farm price in south central Saskatchewan for wheat was \$1.05, for oats \$0.41 and for barley \$0.51 per bushel. At Winnipeg common steers averaged \$5.22, and thick smooth hogs \$9.86 per hundredweight; creamery butter averaged \$0.38 per pound and fresh eggs \$0.41 per dozen. The average yearly value of wages and board for farm help in Saskatchewan from 1922 to 1929 amounted to \$658; threshing rates with board for threshers were: wheat 12 cents, oats 9 cents, and barley 10 cents per bushel; twine was 15 cents per pound; and total taxes on the farms, though varying in amounts, averaged approximately the amounts given in the budgets, on the farms selected for study in the preparation of these budgets.

During the 1922-1929 period, and even at this date (1940) with the smaller farms, particularly on land in the lower land classes, horses were the chief means of field power, and therefore tractors were not included in the operating statement given. Adequate feed has been allowed for the horses and other stock listed and it is considered that full requirements of the farm, including the seed for next year's crop, have been provided for in calculating the amounts available for sale. Depreciation at the rate of five per cent on the present value of buildings, and seven per cent on farm machinery has been allowed in calculating expenditures for capital replacement.

The budget for the farm on land at the upper limit of Land Class II differs from that of the farm on land at the lower limit of Land Class II in having greater receipts as well as increased expenditures. The greater receipts result from the higher yields of grains while the increased expenses result from additional costs of threshing and labour, as well as the operation of a used automobile. The living allowance for the farm family on land at the lower limit of Land Class II is equivalent to the average yearly value of wages and board of a hired labourer, which was considered as the lowest earnings which an operator could be expected to accept for himself and family. For the farm on land at the upper limit of Land Class II, more income is available and it was considered that living costs would be higher than the equivalent of a wage to a hired labourer. For this reason the cash living expenses of \$946 per year as determined by farm management surveys in two representative areas of Saskatchewan in 1929-1930 for a farm family equivalent in size to about four adults, was allowed as the operator's earnings.

APPENDIX B

PERCENTAGE OF THE TOTAL AREA IN EACH LAND CLASS BY MUNICIPAL UNITS,
SOUTH CENTRAL SASKATCHEWAN, ECONOMIC SURVEYS 1936-1939

Municipal unit		Total acreage	Land Class				
Name	Number		I	II	III	IV	V
Lake Alma.....	8	203,310	61.7	20.5	16.9	0.9	.....
Surprise Valley.....	9	198,077	56.6	31.9	11.5	.....	.....
Happy Valley.....	10	198,148	81.5	11.4	7.1	.....	.....
Hart Butte.....	11	205,973	42.8	33.7	23.5	.....	.....
Poplar Valley.....	12	190,091	36.8	32.4	30.8	.....	.....
Local Improvement District ¹	13	197,371	71.1	18.3	10.6	.....	.....
Local Imp. District.....	14	207,020	80.1	17.2	2.7	.....	.....
Local Imp. District.....	15	206,883	93.3	6.1	0.6	.....	.....
Local Imp. District.....	16	206,827	87.3	10.0	2.7	.....	.....
Local Imp. District ¹	17	201,275	61.2	23.3	15.5	.....	.....
Lone Tree.....	18	205,861	43.9	37.4	18.7	.....	.....
Laurier.....	38	204,294	45.8	21.8	31.0	1.4	.....
The Gap.....	39	204,518	32.9	25.7	34.7	6.7	.....
Bengough.....	40	258,502	48.8	26.4	22.6	2.2	.....
Willow Bunch.....	42	249,316	25.8	15.6	41.9	16.7	.....
Local Imp. District.....	43	157,326	59.9	23.3	16.8	.....	.....
Waverley ¹	44	199,837	41.7	36.0	21.7	0.6	.....
Mankota.....	45	206,054	34.2	37.3	27.6	0.9	.....
Glen McPherson.....	46	206,560	65.2	20.7	14.1	.....	.....
Local Imp. District ¹	47	196,574	80.3	10.5	9.2	.....	.....
Local Imp. District.....	48	137,643	62.5	15.9	21.6	.....	.....
Brokenshell.....	68	205,572	43.7	31.0	16.5	2.6	6.2
Norton.....	69	205,020	25.0	30.1	43.4	1.5	.....
Key West.....	70	204,925	12.6	22.2	54.6	10.6	0.4
Excel.....	71	274,074	24.0	14.6	47.5	13.5	.....
Lake of the Rivers.....	72	165,195	14.9	5.8	26.4	31.0	21.9
Stonehenge.....	73	245,354	5.4	5.5	35.0	52.6	1.5
Wood River.....	74	206,387	6.7	12.2	44.6	36.5	.....
Pinto Creek.....	75	206,053	18.0	13.3	52.9	15.8	.....
Auvergne.....	76	206,222	26.2	22.4	45.7	5.7	.....
Wise Creek.....	77	206,199	39.3	22.3	38.4	.....	.....
Grassy Creek.....	78	206,355	50.5	15.1	22.0	12.4	.....
Elmsthorpe.....	100	206,363	30.9	22.4	37.2	9.5	.....
Terrell.....	101	211,457	48.9	22.1	25.3	3.7	.....
Lake Johnstone.....	102	137,058	24.9	8.5	35.5	30.0	1.1
Sutton.....	103	205,899	9.4	9.9	30.9	46.8	3.0
Gravelbourg.....	104	206,389	11.0	6.0	25.7	52.5	.....
Glen Bain.....	105	206,764	5.7	8.6	57.9	27.8	.....
Whiska Creek.....	106	206,465	13.8	12.4	39.4	34.4	.....
Lac Pelletier.....	107	205,811	25.1	11.9	44.7	18.3	.....
Bone Creek.....	108	206,027	11.7	11.2	38.7	38.4	.....
Baildon.....	131	205,613	29.6	10.3	25.6	18.7	15.8
Hillsborough.....	132	113,207	72.4	17.0	5.2	5.4	.....
Rodgers.....	133	176,856	51.9	8.8	23.8	15.5	.....
Shamrock.....	134	184,524	28.0	19.3	42.9	9.8	.....
Lawtonia.....	135	206,093	11.1	15.9	55.6	17.4	.....
Coulee.....	136	206,189	27.2	16.8	39.1	16.9	.....
Swift Current.....	137	268,908	28.9	16.9	31.9	22.4	.....
Webb.....	138	269,536	46.0	15.0	19.5	19.5	.....
Caron.....	162	141,142	32.6	7.9	12.6	9.8	36.9
Wheatlands.....	163	204,626	55.4	22.8	18.5	3.3	.....
Chaplin.....	164	184,028	71.1	16.6	11.4	0.9	.....
Morse.....	165	204,453	35.8	16.1	39.8	8.3	.....
Excelsior.....	166	296,746	29.7	18.4	41.3	10.2	0.4
Saskatchewan Landing.....	167	196,996	27.6	21.2	40.3	6.5	4.4
Riverside.....	168	318,321	34.8	17.0	21.0	14.4	12.8
		11,542,787	39.3	18.3	28.6	12.0	1.8

¹ Does not include 13,009 acres in irrigation block of Local Improvement District's Numbers 47 and 17. (Val Marie Project), 5,760 acres in Indian Reservation Rural Municipality 44, and 10,200 acres in Dominion Animal Quarantine Reservation in Local Improvement District No. 13.

APPENDIX C

History of Wheat Yields

Method of Obtaining the History of Wheat Yields.—In the recorded interview with the farmer, considerable emphasis was placed on obtaining as accurate and reliable information as possible on the wheat yields obtained from his farm. Since only a small percentage of farmers make book entries of this information for any considerable time, one must depend on the farmers' memories for much of this information. In areas where a single crop such as wheat is by far the most important source of revenue of a farm business, fairly reliable estimates may be obtained, provided the enumerator is adept in questioning the co-operator and exercises good judgment in deciding the reliability of the information so recorded. For such estimates fairly reliable average yields for land of a particular soil type, a district, or soil type within a district, may be obtained provided the sample is large enough to average out errors due to over and under-estimating yields. Estimates from a large sample also give an average fairly representative of the results from the usual type of cultural practices and the typical operator.

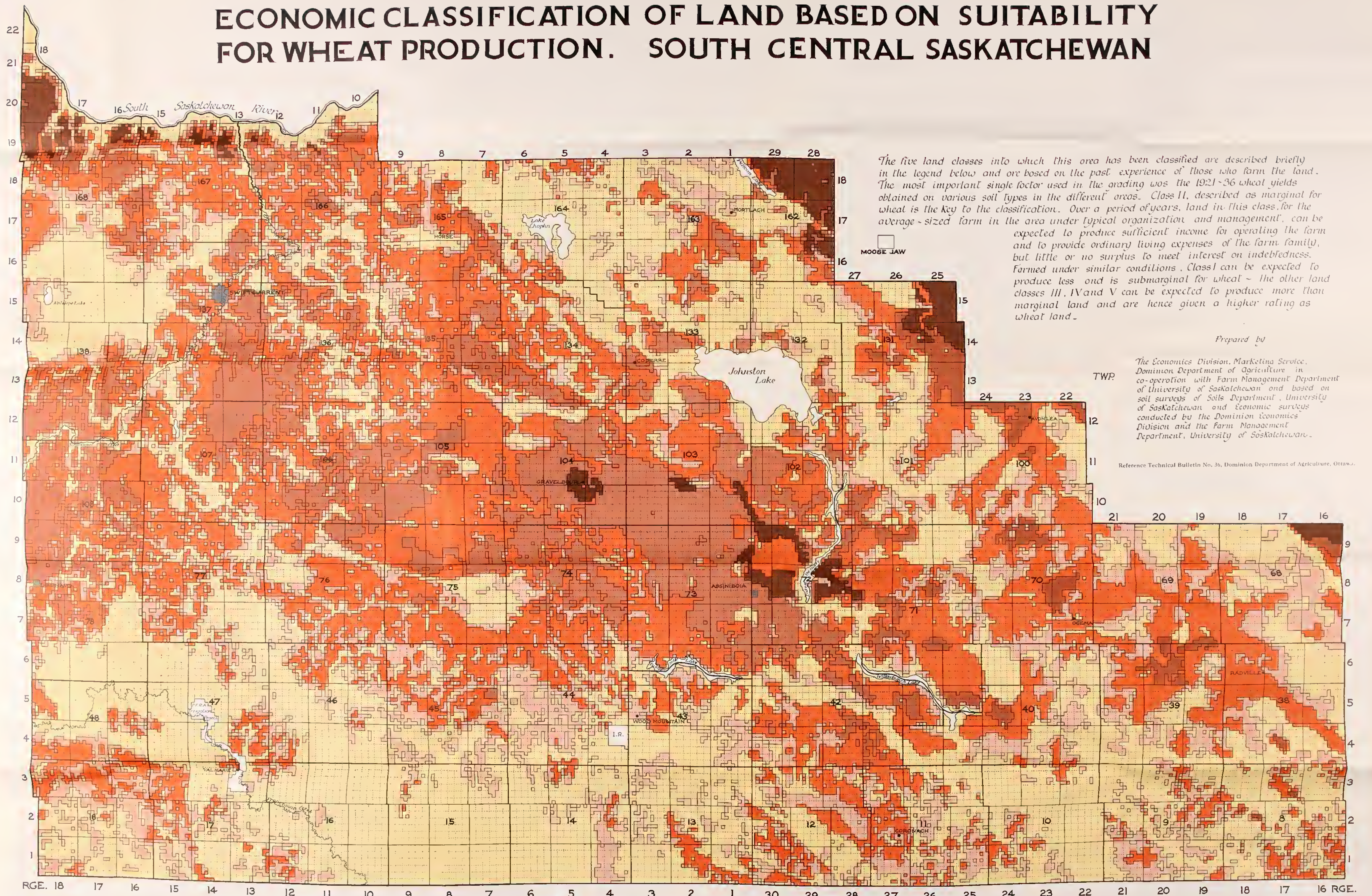
In obtaining wheat yield estimates, an attempt was made to obtain an estimate of the average yield for each year in the sixteen-year period. This was recorded in acres seeded and bushels threshed or average yield per acre, and if there was a considerable difference in the soils of the parcel making up the farm unit at the time the crop was grown, such differences were noted. The objective was to associate the yield with the soil type.

Reliability of Average Wheat Yields Used in Land Classification.—In Saskatchewan the Secretary of Statistics of the Department of Agriculture receives reports from crop correspondents situated throughout Saskatchewan and from these annual statements are issued on acreage, average yield, total production, and other statistical information relating to agriculture by crop districts. From estimates provided by these crop correspondents average yields by municipalities have been calculated and this provides a source for comparing averages computed for the same municipalities from the information assembled in the economic surveys.

A comparison between the survey estimates of seven municipalities covered in 1936 and the provincial figures for the same period shows the former to be nine per cent lower. The difference was less between the two calculated average yields in the other surveys. For the thirteen municipalities covered in 1937 the average yield recorded in the economic survey was one per cent higher than that calculated from estimates furnished by the provincial statistics for the same 1921-1936 period. About the same difference was noted in the average yields computed from the two sources for the eighteen municipal units covered in 1939. Differences may be expected and may be accounted for by the few estimates provided in a single municipality for the provincial statistics and in the economic surveys too many or too few samples on different soil types to give a truly representative average yield for the municipality. However, the differences in the averages computed from the two sources of information are relatively small, and would indicate fairly reliable information on the history of yields in appraising the past productivity of the land.

Records kept by banks on the yields obtained by a number of their clients also served as a source of checking the reliability of the survey figures depicting the yield experience on a number of farms in certain districts. A few banks in the area covered had continuous records of yields of wheat and these were made available for comparison.

ECONOMIC CLASSIFICATION OF LAND BASED ON SUITABILITY FOR WHEAT PRODUCTION. SOUTH CENTRAL SASKATCHEWAN



The five land classes into which this area has been classified are described briefly in the legend below and are based on the past experience of those who farm the land. The most important single factor used in the grading was the 1921-36 wheat yields obtained on various soil types in the different areas. Class II, described as marginal for wheat is the key to the classification. Over a period of years, land in this class, for the average-sized farm in the area under typical organization and management, can be expected to produce sufficient income for operating the farm and to provide ordinary living expenses of the farm family, but little or no surplus to meet interest on indebtedness. Farmed under similar conditions, Class I can be expected to produce less and is submarginal for wheat - the other land classes III, IV and V can be expected to produce more than marginal land and are hence given a higher rating as wheat land.

Prepared by

The Economics Division, Marketing Service, Dominion Department of Agriculture in co-operation with Farm Management Department of University of Saskatchewan and based on soil surveys of Soils Department, University of Saskatchewan and Economic surveys conducted by the Dominion Economics Division and the Farm Management Department, University of Saskatchewan.

Reference Technical Bulletin No. 36, Dominion Department of Agriculture, Ottawa.

CLASS I - Potential annual production of wheat for sale on an average per quarter section is less than 350 bushels. The soil is sandy loam, gravelly, alkali or blow-out loams is inferior, though the topography and other physical features may be favourable for cultivation. Where the soil is more superior loam and clay loam - the surface (decidedly rolling, hilly and rough with frequent occurrence of stones) makes the land unsuitable for cultivation. With some parcels soil texture is the limiting factor, with others it is the amount of land which can be cultivated, while with others, it is a combination of both these features.

CLASS II - Potential annual production of wheat for sale on an average per quarter section is 351 to 475 bushels. The soils - fine sandy loams, light loams and blow-out loams are less affected by blow-outs and in general less inferior than blow-out loams in Class I though the topography and other physical features may be favourable for cultivation. Where the soil is more superior loams, clay loams, the topography is quite rolling, quite stony or with parts of the quarter section non-arable from other causes. As with Class I land, soil texture is the limiting factor, with some parcels, with others, it is the amount of land cultivable, and with still others, both the amount cultivable and the soil texture.

CLASS III - Potential annual production of wheat for sale on an average per quarter section is 476 to 720 bushels. Where the soils are loam the topography varies from level to moderately rolling, while with soils of heavier texture - clay loams, the topography is rolling and stones occur frequently enough to substantially add to the cost of cultivation. Sloughs, potholes and ravines frequently reduce the amount cultivable per quarter.

CLASS IV - Potential annual production of wheat for sale on an average per quarter section is 721 to 900 bushels. The soil varies from heavy loam to clay. Topography is level to undulating with very few stones. Only the occasional slough hinders the total cultivation of a parcel. While this description applies generally to the physical factors of the land in Class IV, there are similar parcels which are rated in Class III. Such parcels occur in areas where the liability from hail damage is high and also in areas where the crop histories indicate more than "usual" drought occurrence.

CLASS V - Potential annual production of wheat for sale on an average per quarter section is over 900 bushels. The soil is generally of a heavy clay texture. Topography is level to gently undulating but well drained and stones seldom occur. Quarter sections in this land class are practically 100 percent cultivable. While this description applies generally to the physical factors of the land in Class V, there are like parcels which have been rated in Class IV. Such parcels occur in areas where the liability from hail damage is relatively high.

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